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Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE
VOL. 102

MAINE BIRDS

BY RALPH S. PALMER

Based largely on data gathered by
ARTHUR HERBERT NORTON

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Corrigenda to MAINE BIRDS

Bull. Mus. Comparative Zoölogy, Harvard, vol. 102 (1949)

P. 19, line 1: *Everett Smith's dates should be* May 18, 1849 - Sept, 7, 1924.
P. 32, 15th line from bottom: *read* . . . young out of burrows late, or transients . . .
P. 75: subsequent information reveals that the Sheld Duck should have been listed as *Erroneously recorded.*
P. 99, 17th line from bottom: *delete parentheses around* Stejneger.
P. 131, lines 17-18 from top: the 300 mergansers seen by Weston were American, not Red-breasted.
P. 133, 9th line from bottom: *the Latin name of the Goshawk should be followed by* (Wilson).
P. 187, Lines 10-12 from bottom: the eggs here mentioned are correctly identified as Yellow Rail's (Bond).
P. 254, 24th line from bottom: *for* Cow *read* Coat.
P. 281, 22nd line from bottom: this paragraph should begin with quotation marks.
P. 294, 16th line from bottom: *for* 1935 *read* 1835.
P. 334, 6th line from bottom: *for* distance *read* distant.
P. 398: the name of the Winter Wren should be *Troglodytes troglodytes hiemalis* (Vieillot).
P. 414: data received after publication indicate that, by 1948, the Wood Thursh was breeding regularly at several York and Cumberland County localities and quite often at a number of other widely scattered points in Maine.

Ralph S. Palmer
New York State Museum
Albany 1, New York
December 10, 1949

From Bulletin Maine Audubon Society
Vol. 6, No. 1. January, 1950. Page 20.

Maine Birds[1]

By Ralph S. Palmer

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Maps are on pages 8, 10 and 12

PREFACE

Accumulation of data used in preparing the present report was begun about 1894 by the late Arthur H. Norton,[2] Curator of the Portland Society of Natural History. Besides tending to many other tasks, he continued to add to these data until a few weeks before his death on January 5, 1943, by which time he had a file of about 17,500 cards with perhaps 60,000 entries on them, filed by species and subspecies. Entries included references to literature, his own observations (the greater bulk), and data from numerous correspondents.

Shortly before his death he made the following written statement:

30 Brentwood Street
Portland, Maine
December 17, 1942

The catalog of birds of Maine, on cards, and the accessory manuscripts belonging thereto, which are at present the property of Arthur H. Norton, I

[1] Published with the aid of a special gift from Mr. G. R. Agassiz.

[2] For biographical sketches of Mr. Norton see: *Auk*, 60: 315–317 (1943) and *Rhodora*, 45: 217–220 (1943).

recommend to go to the University of Maine Library under the care of Ralph S. Palmer of Vassar College, because his methods of work have been so nearly similar to my own. In the event of his loss in the armed services, it is recommended that the above mentioned property be put under the care of Howard L. Mendall and be deposited as above stated.

There are four (4) copies of this document.

[signed] Arthur H. Norton

My visits and correspondence with Mr. Norton began in 1929, after I had completed grammar school, and continued into December, 1942. Since this latter date, and especially since the end of Naval service in 1945, I have added to the file about 3,000 entries, selected from over five times as many, from the literature, various notebooks of my own and others, and extensive correspondence. This file, plus a few short and incomplete drafts of manuscript of Norton's on some water birds, form the main basis of the present report.

The Committee of the American Ornithologists' Union that is working on a revision of the *A.O.U. Check-List* is revising the 'common' names of many birds. With the knowledge that the decisions made by the Committee up to the time this is written may be altered before the *Check-List* goes to press, I generally have given the proposed 'new' names. The 'old' common names are used in the text; the 'new' are given only in the headings. In cases where the 'new' differ markedly from the 'old,' both are given.

An article by Woodcock (1942) is quoted with permission of the copyright owners, the American Association for the Advancement of Science.

This manuscript was submitted for publication on May 29, 1948. Because of delays in arranging for its publication, I have had time to make a few alterations and to add important data on over forty species. The revised manuscript was submitted on November 17, 1948.

INTRODUCTION

GENERAL REMARKS

This volume is intended to be an historical review of the bird life of Maine. No Maine list has been published for 40 years and none whatever has appeared which emphasized ecological aspects and changes known to have occurred in the avifauna. For the sake of brevity, certain material already in print has not been repeated here. Local names, for example, were given by Knight (1908b) and only a few are included in this report. In attempting to be brief, I have, in some instances, possibly sacrificed a certain degree of accuracy. Thus, to state that the young of a species are fed "by regurgitation" does not specify which of the three variants of this method of feeding is involved, and in some cases two of these may be used at different stages of development in the young of a single species. There is little point in trying to present detailed and complete life histories of all species in a volume meant to be portable. On the other hand, I have avoided the use of a telegraphic style of writing, even though, by using it, much more material might have been included in the same amount of space. Such a style is not suitable for a volume which has many quotations of varying length.

The presentation of material differs markedly from the way Norton conceived a Maine list. He would have written a briefer one, disposing of many birds with a single paragraph at most, and seldom allowing more than a page of typescript for any bird. Norton never was able to concentrate long on any one project, so divided was his time by his many duties. He had practically no aid of any kind, even having to do the janitorial work himself. He was discouraged at times because he felt that interest in a revised work on Maine birds was lacking. I once asked him when he thought his proposed list would be ready for publication; he said he never expected to complete it, but would keep adding data to his files as time went on. The result was no manuscript in finished form, but a great amount of information on cards. It has seemed advisable to place much of this material on record as soon as possible.

My own interests have differed from Norton's in some respects. They have included certain ethnological and folklore aspects of local ornithology, also behavior, ecology and conservation to a greater degree. Since 1937, I have searched through hundreds of volumes of journals (sometimes duplicating work done by Norton) and, by this means and through extensive correspondence, have been able to broaden the scope of material covered. This approach has enabled me to check on the reliability, for example, of some of the statements in

sporting journals, and to link the proper personages with some of the pseudonyms formerly used by contributors.

As a general rule, those birds that have been studied most extensively in Maine receive the most space in this report.

I have not included a prefatory historical review of ornithological work done in the state. It is omitted partly for the sake of brevity, but chiefly because its preparation would have necessitated a study of material widely scattered in many museums and collections, and neither time nor funds were available for this. Further, there are no general summaries of migration, ecology, life zones, flora, climate, geology, etc., because: 1) in these matters Maine should be considered in its relation to the rest of New England and at least all the land area south of the Gulf of St. Lawrence, and 2) I have not been able to study such matters sufficiently to arrive at relevant generalizations.

As to life zones, in the C. H. Merriam sense of the term, probably the faunal map used as a frontispiece by Knight (1908b) is as accurate as can be made, allowing for the fact that one should substitute "Alpine" where he used "Hudsonian." So-called 'cultural' changes which have occurred since the advent of Europeans have made profound differences in the flora and fauna of the state. This is reflected clearly in changes in bird distribution. In the face of these known changes, the life zone concept and some of its successors, as applied to birds, are useful but inadequate. Further study may yet lead to a better basis for treating bird distribution.

LOCALITIES

The user of this report will find it advisable to study the maps on pages 8, 10, and 12. When citing records, localities shown on the maps are, generally, referred to without mention of the counties wherein they are situated. These particular localities are mentioned frequently. For other places, the county is given the first time that the locality is mentioned under any one bird.

Reference Works; Place Names

In preparing this report, the following sources dealing with geographical localities have been particularly useful:

The revised (1944) atlas of *Maine General Highway Maps*, prepared by the State Highway Commission, has been used more than any other single source, being a convenient means of locating towns, townships, and ranges.

Topographic quadrangle maps of the U. S. Dept. of Interior, Geological Survey, are available for all of the state except parts of Aroostook, Somerset, Piscataquis, and Penobscot Counties.

County maps, published by Prentiss and Carlisle, of Bangor, were useful for that part of the state not covered by Geological Survey topographic quadrangle maps.

The latest U. S. Coast and Geodetic Survey chart, *West Quoddy Head to New York*, was used for the Gulf of Maine.

Attwood's recent (1946) gazetteer has many uses. Anyone who consults early maps, county or other local histories, and other documents, will find old names and their present equivalents, if any, in this volume. Naturalists should note particularly Attwood's section on repetition of place names, also the data on state parks, the National Park, national recreation and demonstration areas, national forests, state game preserves, sanctuaries, and game management areas. The faunal lists are, for the most part, rather out-of-date. The bird list was based mainly on Knight (1908b).

When using material from early voyages or histories, dealing with the period before Maine's present political boundaries were established, I have cited data for within the present political boundaries unless otherwise stated (but note discussion of Machias Seal Island below).

In general, I have followed the local practice of using an "s" and omitting the apostrophe from possessive place names, *i.e.* Cousins rather than Cousin's or Cousin Island. Local practice in this matter differs from the 'official' labels in most atlases and on many maps.

The Seaward Area

The seaward area is determined by physical boundaries and one must begin by defining the Gulf of Maine (see p. 8). This consists of the oceanic bight from Nantucket on the west to Cape Sable, Nova Scotia, on the east. The shoreline includes those of eastern Massachusetts, of New Hampshire, Maine, and parts of New Brunswick and Nova Scotia. According to Bigelow's report (1926: 6–7) on the plankton of the gulf, the land boundaries "are continued offshore by Nantucket Shoals on the one side and Browns Bank on the other, which roughly demark the boreal waters of the gulf from the warmer coastal water off southern New England, on the one hand, and the lower sea temperatures along southern Nova Scotia, on the other. . . The reader will note that, as defined here [to about the 150-fathom line], the Gulf of Maine includes the whole of the offshore rim formed by Georges and Browns Banks and the two main deep channels—Eastern and Northern—that pierce it."

In the present report I have chosen to draw the 100-fathom line, which is close to that for 150 fathoms, because the former reveals the bottom contours within the gulf in better fashion. The seaward rim

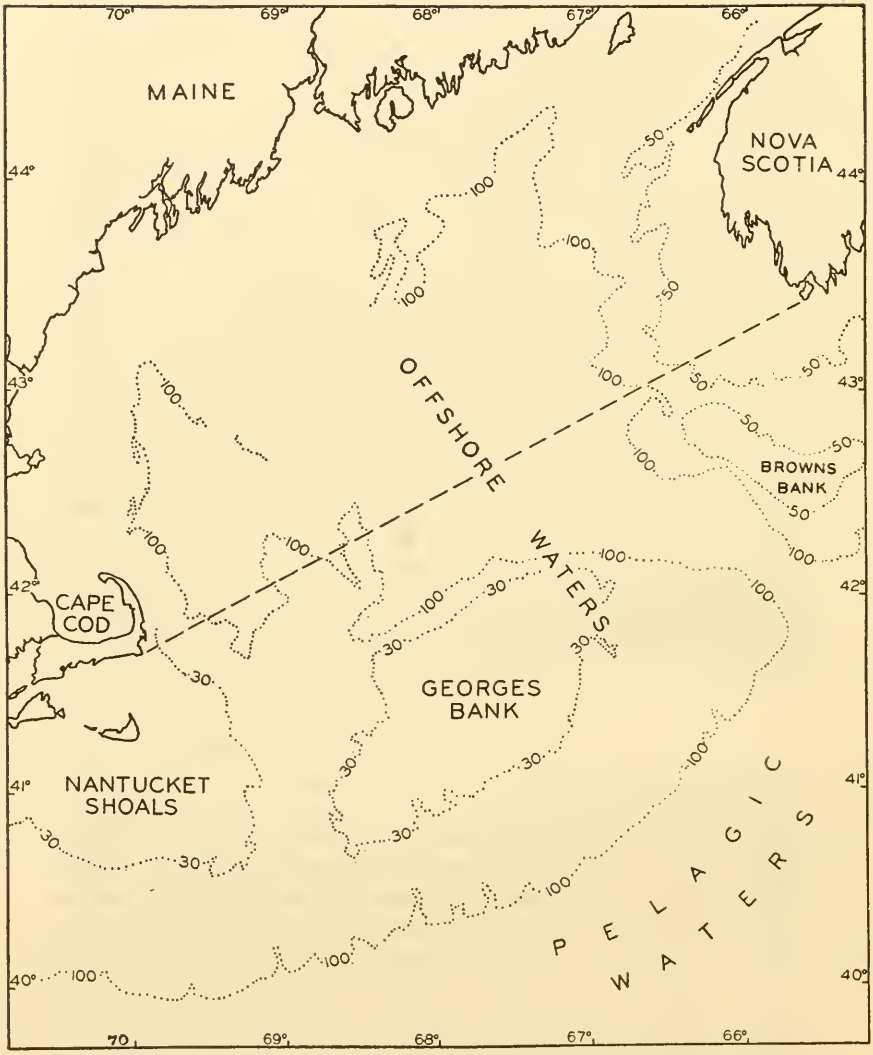

Fig. 1. The seaward boundary of the Gulf of Maine lies just beyond the outermost 100-fathom line; here the water increases greatly in depth in a short distance. Only birds known to have occurred on the landward side of the Cape Cod to Nova Scotia line are included in the present study.

is well beyond an imaginary line from Chatham, on Cape Cod, to Cape Sable Island,[1] Nova Scotia. This imaginary line, which marks an important migration route for some birds, is about 230 nautical miles long, and from this to the Maine coast the distance varies from about 100 to 120 miles. The seaward rim lies from 75 to 130 miles beyond the line.

The following terminology is hereinafter used for marine waters:

Pelagic waters—beyond the seaward rim of the Gulf of Maine.

Offshore waters—from the seaward rim shoreward to a line connecting points six nautical miles off outer headlands on the coast and seaward promontories on Isle au Haut and Mt. Desert Island. These waters may be divided further into *outer offshore waters* (beyond the Chatham to Cape Sable Island line) and *inner offshore waters* (within the line).

Inshore waters—from a line drawn connecting points six nautical miles off the headlands and promontories as stated above in to high tide line on the shore. See map on p. 10.

The present report deals only with birds that have occurred on the landward side of the Chatham to Cape Sable Island line, as the mainland of Maine can hardly be said to have much effect on the bird life of the waters to seaward of it.

On the map on p. 10 a line has been drawn from Kittery, York County (with a detour around the New Hampshire part of Isles of Shoals), to intersect at right angles the Chatham to Cape Sable Island line. It passes to seaward of Cape Cod. On the east a parallel line has been drawn to exclude the Grand Manan archipelago, the Bay of Fundy, and the islands off Nova Scotia.

Offshore islands, as hereinafter mentioned, are those in offshore waters. Most are relatively small islands or rocks. Going from west to east, these may be noted as follows, bearing in mind that the Isles of Shoals and Boon Island are borderline cases and considered inshore:

Monhegan, in Lincoln County waters, is a high, partly wooded, island; this locality with the adjacent islet, Manana, and the surrounding ledges, is a notable place for observing bird migration.

The Matinicus group, in Knox County waters, is composed of low land, except for the outer Matinicus Rock; the islands are boreal in aspect and have been covered mostly with grass and low woody vegetation as far back as written records go. Some boreal plants found in abundance there are nowhere abundant on the mainland west of Petit Manan Point, Washington County.

Mt. Desert Rock, off Hancock County, is a very small rock on which there is a lighthouse. Both migratory birds and bats have been noted here, but the recorded data are few.

[1]Not to be confused with Sable Island, about 275 miles to the eastward.

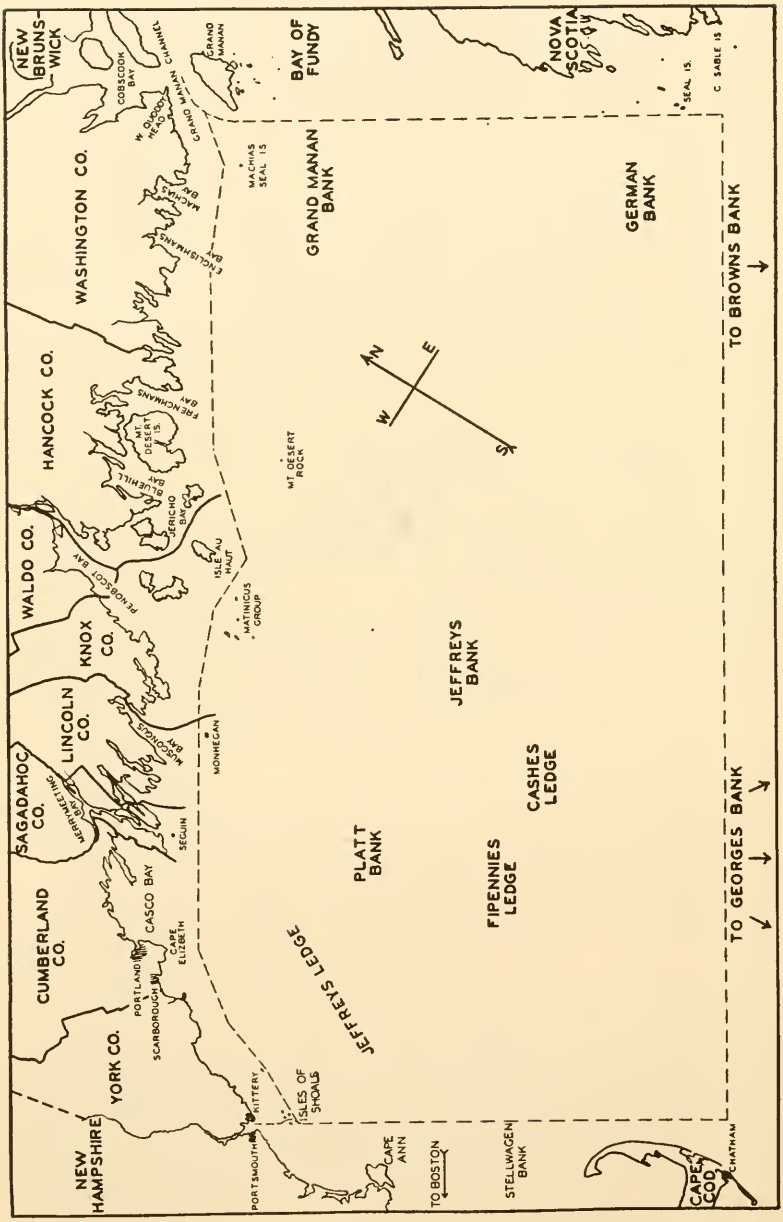

Fig. 2. Inner offshore waters included in the present study are within the rectangle outlined by the broken line; inshore waters included are between the coast and the broken line.

Machias Seal Island lies about 11 miles off Cutler, Washington County; it is .04 square miles in area. The seabird population here generally was included in tabulations of Maine seabird colonies until recently, although there has been a question in the minds of many persons as to whether this island was United States or Canadian property. A letter of February 24, 1948, from the Department of State in Washington contains the following paragraph:

> There is not in force between the United States and Canada any treaty or other agreement containing provisions specifically relating to Machias Seal Island. The unresolved problem concerning that island is whether sovereignty over the island accrues to the United States or Canada by virtue of territorial provisions contained in the treaty of peace of 1783 with Great Britain, or whether the island belongs to Canada through occupation and use during the past 100 years or more, said occupation never having been protested by the Government of the United States.

Communications received in November, 1947, from Dr. Harrison F. Lewis, of the Dominion Wildlife Service, state that the island was formally expropriated by the Government of Canada in 1912, that in accordance with customary international usage Canadian territory extends for a distance of at least three miles over the sea from any Canadian land, and therefore includes North (sometimes called Northeast) Rock, and that the island is part of Charlotte County, New Brunswick.

Since Canadians long have occupied the island and right of prescription is an accepted principle in international law, it would appear to me that the island is now Canadian. I have included it in the present report and have labelled it as Canadian territory whenever it is mentioned.

The other ledges and banks in offshore waters are submerged features, although waves break at some of the ledges during bad weather.

As for localities in inshore waters, the Isles of Shoals, at the western end of the Maine coast, are partly in the town of Rye, New Hampshire, and partly in Kittery, York County, Maine. The Maine group includes Duck, Appledore, Smuttynose, and Cedar Islands, and numerous rocks. Seguin, off the mouth of the Kennebec River in Sagadahoc County waters, is a high island. Its ornithological importance is due chiefly to the fact that so many valuable observations were made there by Herbert L. Spinney, from 1893 to 1907.

The larger inshore islands to the eastward show a number of differences, especially in the absence of certain birds as breeders, from the adjacent coast. The known differences are pointed out hereinafter when giving the status of various species.

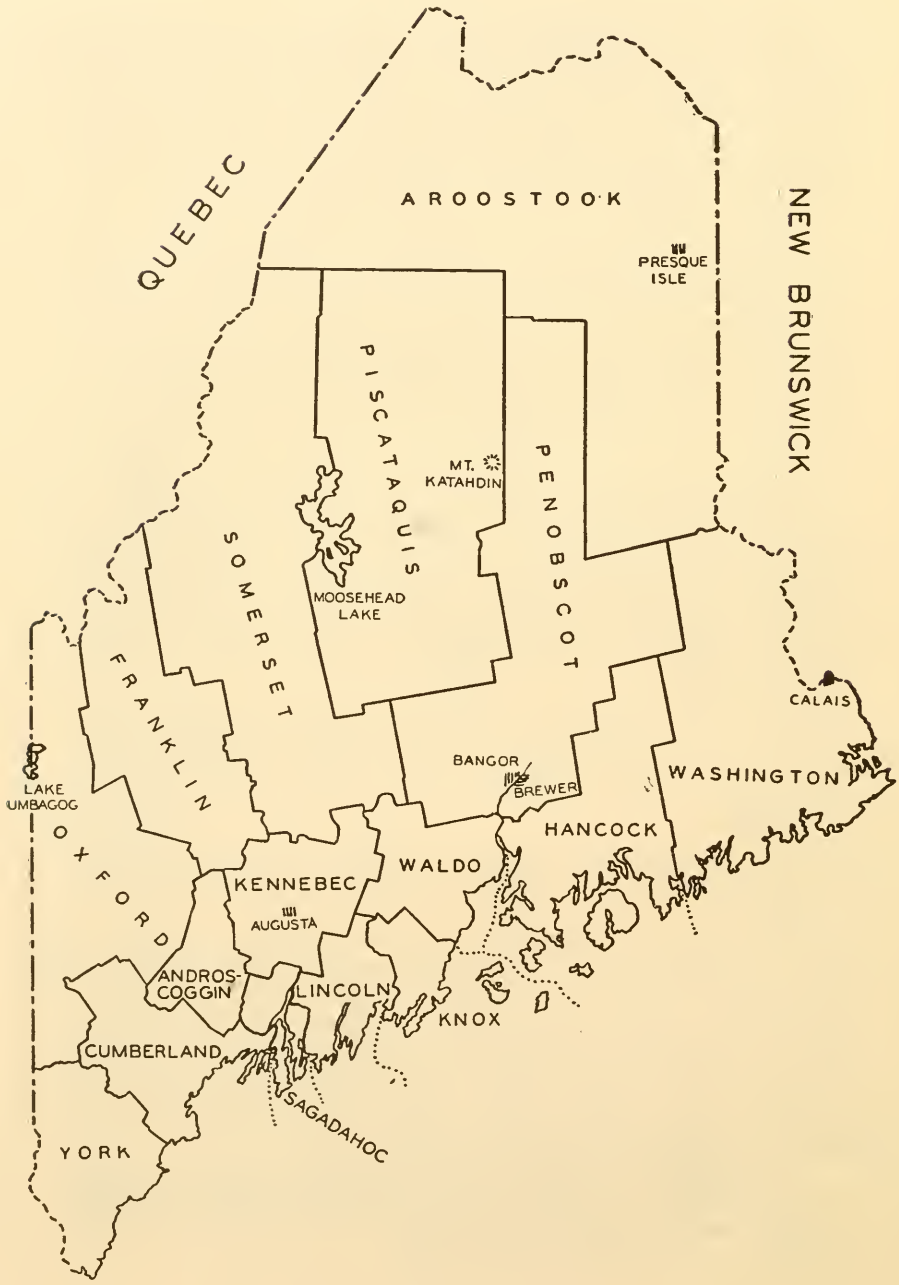

Fig. 3. Maine County Map.

The Maine coast has its eastern boundary at West Quoddy Head, where Cobscook Bay enters the Grand Manan Channel.

The Land Area

The area of the state, including islands, is, by summation: land, 19,462,301 acres (30,410 square miles); inland water, 925,959 acres (1,447 square miles); and bog or swamp, 710,552 acres (1,110 square miles). The total is 20,388,260 acres, or 31,857 square miles. These figures are from Attwood (1946: 18) who pointed out that the summation is about two per cent in error and that the accepted total figure, obtained by quadrilateral measurement, is larger, being 20,839,680 acres, or 32,562 square miles.

The land area (see map on p. 12) is determined by the political boundary, which is strictly an arbitrary feature in some places, but follows conspicuous topographic features in others. In Oxford County the line passes through Lake Umbagog, the larger water area being in New Hampshire. In utilizing William Brewster's valuable report on "The Birds of the Lake Umbagog Region of Maine," I have cited occurrence (specimen and sight records) for the Maine side unless otherwise stated, but often have disregarded the political boundary when giving his data on habits. Ornithologically, Umbagog is one of the best known localities in Maine, while Moosehead, which is a much larger and more impressive body of water, is very poorly known.

In Washington County the St. Croix River forms part of the boundary demarking Maine from New Brunswick. The region of Calais, Washington County, adjacent New Brunswick, and the waters and islands at the mouth of the Bay of Fundy, are particularly noteworthy, for it was here that George A. Boardman (*born* Feb. 5, 1818; *died* Jan. 11, 1901) did most of his collecting. He came to Calais with his parents in 1828 and lived there until December 9, 1843; he then moved across the river to Milltown, New Brunswick, where he lived until 1881; thereafter he traveled a great deal, returning occasionally to Calais, where he settled permanently in the spring of 1884. During most of his active years of collecting he lived on the New Brunswick side. His correspondence sometimes was headed Milltown, New Brunswick, sometimes Calais, Maine, sometimes Milltown, Maine (a hamlet in Calais), but more often just Milltown. His printed labels read: "Explorations in or near New Brunswick, George A. Boardman, Calais, Maine." Occasionally he added date and locality to a label, but often did not record these. The data on his eggs were equally poor. It is easy to understand how persons who read the printed word "Calais" on the labels have wrongly stated the locality for some of his specimens, most of which undoubtedly came from New Brunswick.

Some of the data that he did record are now lost, his journal has not been located, and at this late date one cannot even be certain whether some of his printed statements were based on hearsay reports or concrete data, and whether reference was to Maine, New Brunswick, or both places.

Several other localities need brief mention. Mt. Katahdin has an extensive area on it which is above tree line. The flora of this Alpine zone is well known compared to the fauna, but further study of both is needed. There are smaller treeless areas on other Maine mountains, about which even less is known.

Scarborough, on the coast of Cumberland County, is noteworthy because of the great amount of shorebird and wildfowl shooting done there in former times, especially as recorded in the shooting journals of several persons.

Merrymeeting Bay, Sagadahoc County, is treated as inland waters. The water is brackish rather than salt, even though the tide is a prominent feature. It is a meeting-place of several rivers, with a common outlet—the Kennebec River—to the sea. A few typically marine wildfowl have been noted at the bay.

Bangor and Brewer are at the head of tidewater on the Penobscot River. The famous Bangor Salmon Pool, below the Bangor-Brewer dam, is considered as inland waters, although certain marine ducks and gulls have been observed there in the colder months when the river was frozen for miles downstream.

PLAN OF THE WORK

Outline

I have aimed at including all known birds of the state, including fossil, extinct, extirpated, and introduced species. A few others are noted for various reasons. Omitted are birds which have been recorded and stated, at the same time or later, to have been escaped captives. Omitted also are one or two species whose occurrence has been suggested, but for which there are no known records. Quite a few European or other foreign birds were listed erroneously by early writers as occurring in Maine. There seems to be no need to list these. A problem calling for cautious treatment was whether to infer that certain birds which occurred inland in areas adjacent to Maine, had also occurred in inner offshore waters of the Gulf of Maine. For example, one petrel species, not known from our marine waters, has occurred inland in New Hampshire as a hurricane visitant, but the hurricane may have reached this area overland and not via the inner part of the gulf.

Where I have given all records, these follow a brief statement of status and are listed by one of two methods. When there is an apparent or actual change of status over the years, records are listed chronologically by year in most instances. When there has been no apparent change, I usually have listed them seasonally.

When full treatment is accorded any bird, the divisions used are as follows:

Summary of status.

Spring migration occurrence with extreme dates and, where possible, dates between which most birds are seen.

Fall migration occurrence, with dates as above. This precedes spring occurrence in the case of winter residents and winter visitants.

Flight years or *incursions*, the former denoting a period of unusual numbers within a season of regular occurrence (years of marked scarcity, when known, also placed under this heading), and the latter denoting an invasion in numbers, of birds that may or may not occur regularly, lasting for part of a season or longer.

Breeding and/or *summer*, the former term being used for breeding birds only and including available Maine data (which, when necessary, are supplemented by data from outside the state and are so indicated) to provide information on nest, number of eggs, laying season, incubation and fledging periods, and number of broods per year. Admittedly this is sketchy, but lack of space forbids expansion. The term "summer" is used for non-breeders when data warrant fuller treatment than given under summary of status. The two terms are used together when there are data of interest on the non-breeding birds of a species breeding in the state. If a bird has ceased breeding in Maine, former breeding is discussed under Remarks.

Winter status.

Ecology includes comments on habitat and often on methods of securing food, also sociability and other traits—if such may aid in briefly defining the relation of the species to its environment. These data, unless otherwise stated, are for within the political boundaries of the state and/or marine waters within the scope of this work.

Remarks include historical changes in status, food, economic status, behavior, early records, and any other matter deemed worthy of mention. Scientific names of food items are just as published originally by authors, the nomenclature not being brought up to date. In giving first Maine records of many species, I have not used bird names listed in various Indian dictionaries. The manuscript of the Rasles dictionary, for example, which was begun in 1691 and finished within the next 30 years, although not published until much later, contains (Rasles, 1833: 383–384) quite a good list of bird names used by the Norridge-

wock Abnakis. Comments on taxonomy, extralimital records, and corrections of erroneous published statements usually come at the end.

Terms of Occurrence

Whereas other self-explanatory terms also are used, the basic terminology is here defined:

Resident—occurring regularly in the same general area throughout the year. Otherwise the term is qualified to "summer resident" (implies breeding, but may include non-breeders), "non-breeding summer resident," and "winter resident." "Locally migrant" or other qualifying terms are used if the species is not sedentary.

Transient—passing through, en route between a summer and winter residence, both of which are outside of the area concerned.

Visitant—being present for a short time only, the proper qualifying terms being used to indicate season or seasons of occurrence.

Introduced—an exotic bird, liberated by man within the state, or outside of the state and having extended its range to Maine.

Extirpated—driven from the state by man, although still extant elsewhere.

Extinct—none now alive anywhere.

Fossil—which is self explanatory.

Hypothetical—unsatisfactorily recorded for any one of a number of reasons. I have not adhered to the rule of relegating to this category all species reported, but for which no Maine specimen has been examined by a qualified ornithologist. In a number of cases, observers with long experience have seen birds in the state which hardly could be confused with other species and have published these observations. A few hypothetical birds are here first recorded, justifiable to Norton or myself (or both of us) by the importance of the data and knowledge of the observer. Admittedly this is subjective treatment, but after careful study I have been unable to formulate a satisfactory rule to follow that would cover all cases with equal fairness.

Terms of Numbers

If there are very few records (usually four or less), the number of these is stated and the records given. In other cases, although there are instances where I have used other terms which are self-explanatory, the following are the basic categories:

Rare—average of one record in six to ten years.

Occasional—average of one record in three to five years.

Uncommon—a few present every year or nearly so.

Common—present in such numbers that one may find several in a day in the proper habitat.

Numerous—present in such numbers that one may find many in a day in the proper habitat.

Abundant—present in such numbers that one may find a great many in a day in the proper habitat.

If a bird fits between any two of these categories, proper qualifying terms are added. For example, to state that a bird is rather common places it between uncommon and common as defined above.

Treatment of Processed Literature

A problem of importance has been to devise a satisfactory method of dealing with reports presented in the mimeographed *Bulletin of New England Bird Life* [Oct. 15, 1936 to Dec., 1944], its photolithographed successor, *Records of New England Birds* [Jan., 1945–], and the first two volumes, which were mimeographed, of the *Bulletin of the Maine Audubon Society* [Jan., 1945 to Oct., 1946]. I have catalogued Maine data in the first and last and in the second through October, 1947. These various bulletins are not organized for brief citation, data included have not always been carefully screened to remove questionable reports, and errors have been made in placing material on record. Therefore I have not cited these, which hardly can be dealt with as published material. My method has been to contact the observer, in those cases where reports appeared to be of sufficient value to warrant attention, and check the matter directly. Some contributors very kindly have loaned me their daily journals. I have tried to contact all persons whose data were used in the present volume, to obtain verification and permission to use these. In a few instances, reports were incorporated in the manuscript and then, probably because of changes in address during the war years, I have been unable to locate the person concerned up to the time of submitting this manuscript for publication. In these few cases (less than fifteen), I have taken the trouble to consult the editor of the report concerned. All reports in these bulletins have been considered, which has resulted in a large proportion being discarded.

Persons Referred to by Last Name

The following persons, whose unpublished records were obtained through Norton or directly, are hereinafter referred to by last name only, whether in citing published or unpublished data of theirs, as their names are mentioned often. For example, of the several Smiths or three Grosses, first initials always are given for all except the one whose name occurs in this list:

Bond, James [Jan. 4, 1900–]. Has done field work mainly in

Hancock County, yearly since 1925, and in no year earlier than May 10 or later than November 10.

Chamberlain, Glen David [June 28, 1903–]. Has kept migration records at Presque Isle since about 1931.

Cruickshank, Allan Dudley [Aug. 29, 1907–]. Has spent much time in summer in the Muscongus Bay region since about 1936.

Eckstorm, Paul Frederick [May 18, 1896–July 5, 1943]. Of Brewer, the son of Mrs. F. H. Eckstorm, and grandson of M. Hardy, the latter listed below; traveled a great deal in the state, collecting eggs and skins.

Gross, Alfred Otto [April 8, 1883–]. Has taught at Bowdoin College, Brunswick, since 1912, and has published numerous life history studies based largely on Maine data.

Hardy, Manly [Nov. 11, 1832–Dec. 9, 1910]. Of Brewer, noted fur buyer and naturalist who had a large bird collection. Many of his journals were obtained on loan from his daughter, the late Mrs. Eckstorm.

Harris, William George Fowle [May 31, 1905–]. Of Dorchester, Massachusetts; collected with Eckstorm, and has continued to collect in the state since the latter's death.

Haven, Herbert Morris West [Dec. 16, 1885–Feb. 26, 1949]. Of Portland; has recorded data on ornithological matters of interest for many years.

Loring, Caleb Gould, jr. [Oct. 2, 1820–Aug. 28, 1868]. Hunted at Scarborough and elsewhere in Cumberland County, ran a shooting lodge at Scarborough, and kept a detailed shooting journal from 1842 to 1854.

Mendall, Howard Lewis [Nov. 21, 1909–]. Leader of the Cooperative Wildlife Research Unit at the University of Maine; has published many papers on Maine birds since 1935, and has supplied many unpublished data.

Norton, Arthur Herbert [April 19, 1870–Jan. 5, 1943]. His files of data form the main basis of the present work.

Palmer, Ralph Simon [June 13, 1914–]. Formerly of Brunswick; author of the present work.

Pillsbury, Edward Blanchard [Oct. 22, 1874–Sept. 30, 1940]. Hunted in Cumberland County, mostly at Scarborough and vicinity, and kept a shooting journal from 1891 to 1912.

Rackliff, Frederick [May 2, 1851–July 8, 1935]. Of Sprucehead, South Thomaston, Knox County; a keen observer and collector of seafowl, supplied Norton with many data and specimens.

Rich, Walter Herbert [Oct. 12, 1866–Oct. 19, 1948]. Of Falmouth; author, sportsman, long-time employee of the U. S. Bureau of Fisheries, and successor to Norton at the Portland Society of Natural History.

Rogers, Alpheus Groves [1843–June 14, 1913]. Hunted mostly in Cumberland County, and kept a shooting journal from 1865 to 1912.

Smith, Everett [Oct. 13, 1856–March 20, 1941]. Of Portland; author of a list of Maine birds in *Forest and Stream* and other bird papers, and contributor of much unpublished material to Norton's files.

Spinney, Herbert Lyndon [Sept. 25, 1862–Nov. 25, 1943]. Of Bath; collected many birds in his younger years, published numerous brief notes, and, while in the Lighthouse Service, kept a valuable journal of his observations at Seguin from 1893 to May, 1907.

Weston, Robert [Dec. 21, 1889–]. Of Brewer; has kept records of his observations in Maine for about ten years, his data on the smaller land birds being especially useful.

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Mendall and Bond read the entire annotated list, and furnished many useful suggestions and added data. I wish to express my sincere appreciation for their valuable assistance. Mr. L. T. Ibbotson, librarian at the University of Maine, has been most cooperative in loaning Norton's files and certain books for the period during which this manuscript was in preparation. I owe many thanks for courtesies extended me by persons at the Museum of Comparative Zoölogy at Harvard, especially Mr. J. L. Peters, who helped with nomenclatural matters, and members of the library staff. My wife, Eunice Nelson Palmer, has helped in many ways, such as verifying references, and typing the entire manuscript, much of it at least three times.

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Many persons volunteered to submit data on learning that a publication on Maine birds was in preparation. Many others, and also institutions, have supplied information on request. Several pages would be required for listing all these sources here; most are mentioned later when their data are cited. My thanks are due these persons and institutions for assistance kindly given.

I am solely responsible for the manner in which data received have been used, as well as for the manner of utilization of numerous valuable suggestions from those who have read the manuscript or portions of it.

ANNOTATED LIST

Family COLYMBIDAE

Greater Common Loon

Colymbus immer immer (Brünnich)

Summer resident, common on fresh water lakes and ponds inland, decreasing to absent near the coast and local in northern York County, and a few non-breeders occurring on salt water; *transient* in spring and fall, rather numerous coastwise and common inland; *winter resident*, fairly common on salt water.

Spring. Transients have been noted from April 20 to May 16 (Norton).

Fall. This migratory movement occurs throughout October and into early November. On October 27, 1927, Norton saw a scattered flock of 36 of these birds in Jericho Bay near Isle au Haut, Knox County.

Breeding and summer. Of 12 nests found about northern Maine lakes in 1877 and 1878, there were great differences in structure, "some being quite elaborate, others a mere scooped-out cavity in the bog or sandbank. . . One nest was the mere surface of a muddy bog that was floating on the surface of the water, but only partially detached" (Baird, Brewer, and Ridgway, 1884, 2: 449). Most nests are sizeable heaps of vegetation, including some sticks, near the water's edge. Eggs (usually two, rarely one or three) usually are laid in May and the first three weeks of June. A bird was found incubating as late as August 10, 1908, at Sebago Lake, Cumberland County (Norton). Knight (1908b: 26) gave the incubation period as "very close to 29 days," but this is probably too short. Young have been seen from the first week in July on, and on salt water in Casco Bay by August 25 (Norton), which might indicate that six weeks or longer are required to attain flying age.

At Onawa, Piscataquis County, Terris Moore watched loons through a telescope from 50 to 100 yards distance over a period of several seasons, from his cabin, and noted: 1) when the young are small, the adults fish for them, 2) only one of the adults, believed to be the female, gives the food to the chick or chicks, 3) if one of the adults, believed to be the male, catches a fish, he gives it to the mate who gives it to the chick, and 4) when the chick is somewhat older, the female kills or cripples the fish and puts it down near the chick, so that the latter picks it up.

One brood is raised yearly.

Evidence that this species breeds on salt water is unsatisfactory. A few non-breeding loons, sometimes in small loose flocks, are seen along the coast in summer.

Winter. It is my belief that most or all of the winter population comes from points outside the state. Perhaps a few that linger late inland merely move to the nearest salt water. At this season loons are scattered the length of the coast, in inshore waters, and sometimes about outer islands. Sometimes a few birds linger too late on fresh water and get caught by the freeze-up. Boardman (1874b) gave an account of the finding of many loons in a small area of water kept free of ice by the birds, at Big Lake, Washington County. About 30 were killed with sticks as they jumped out on the ice and floundered about, unable to take wing.

Ecology. This is an inhabitant of lakes and larger ponds when there is open water; at other times it is a marine bird. While this species feeds to a great extent near the bottom, it is doubtful that this is wholly the case. Like the Double-crested Cormorant, it shows no marked preference for bottom character, feeding over rocky, gravelly, sandy or muddy bottoms, off the outer shores or in the sheltered coves and arms of the sea, as well as in inland waters.

Remarks. "The Loon has always been regarded as a destroyer of game-fish and for that reason was not included in the list of those protected by law. It certainly is almost, if not quite, exclusively a fish-eater, and probably, in small, inland ponds, where trout are small, devours a good many. But in Sebago Lake and other large lakes my observations lead me to believe that it does little or no harm. In most large lakes salmon and trout are mostly too large for the Loon to trouble and it restricts its diet to the smaller surface-swimming and shore fishes, such as smelts, chubs, etc. In Sebago Lake these are so numerous that it can do no harm in that direction" (Kendall, 1907: 86).

"The possibility that the Loon may render a service to conservers of game-fishes, by holding in check in some degree the destroyers of fish-eggs, or in destroying the fishes affected with contagious gill-fungus and other diseases, has never been given consideration. . . Unquestionably it is the weaker specimens of the species eaten that constitute the greater part of the Loon's diet. On the other hand some, as the suckers, are very destructive to the finest game-species, eating large quantities of their eggs, while themselves of little value as food or game" (Norton, 1915a: 71).

This species has a very wide distribution. Attempts to correlate size with portions of the range are not wholly successful, for much variation has been found. This has been noted by Macgillivray for Britain, Witherby for Europe, L. Bishop for North Dakota and the

west, and by Smith (1882–83: 223) for Maine. The matter is complicated further by birds wandering far from their 'normal' range outside the breeding season.

The following Maine records give some idea of the variation in weights: a bird of the year taken in late October, 1929, at Merrymeeting Bay, weighed 5 pounds (Haven); one reported by Hardy (1900) weighed 6 pounds; a bird of the year found dead at Scarborough weighed 8¼ pounds (Miss I. Powell); an adult male shot on August 1, 1941, on Chamberlain Lake, Piscataquis County, weighed 12½ pounds (Palmer); one reported by Anonymous (1896a) weighed 13½ pounds; one taken on April 19, 1899, near China, Kennebec County, weighed 14 pounds (C. H. Morrell, 1899b); and one taken in 1881 in Penobscot Bay weighed 17 pounds and 10 ounces (Buker, 1881b).

Norton noted that molting birds are to be seen from about March 20 to late April and in the latter half of September. Occasionally a bird in winter plumage is seen in June or July.

On the coast, when the weather is changing, these birds are particularly noisy. Knight (1908b: 27) quoted the fishermen's saying: "The Loons are trying to blow up an easterly." Those interested in the voice of the loon should read the descriptions of it by Hubbard (1883: 86–90) and Brewster (1924: 49–50).

One of a pair, perhaps the male, frequently is seen dashing about on the water in May or even later. In early August I have witnessed a number of particularly severe fights between loons, on Chamberlain and on Eagle Lake in Piscataquis County. These always seemed to start when a bird or a pair would attempt to come near another pair or family group. By September most of this is past and the more usual sight on lakes is a line of migrating loons, sometimes as many as 15, swimming in single file, and spaced from 10 to 30 yards apart.

Members of a pair usually dive within a few seconds of each other and emerge in the same manner. When half a dozen birds are seen diving, there is likely to be nearly or twice that number, feeding in a loose flock, with diving and rising to the surface so timed that only a few are in sight at once. If they become mildly alarmed, diving is suspended until all have surfaced, when they begin swimming away.

In coastal waters, Norton recorded a series of submergences as follows: in water of 4 feet to a possible 30, the range of 26 dives was 8½ to 60 seconds; in the strong current of a channel, 2 dives were 35 and 41½ seconds; and on a sandy bottom beyond the breakers, in 10 to 15 feet of water, nine dives ranged from 19½ to 51 seconds (6 being 36 to 42) and on another occasion at the same spot, two 50-second dives. A 60-second submergence in about 30 feet of water was noted near Isle au Haut in November. From observations at Lake Umbagog,

Brewster (1924: 47) presented evidence which indicates that sometimes a loon will go nearly straight down for perhaps 25 feet.

Knight (1908b: 25) estimated "far under" 1,000 pairs of loons nesting in Maine. Although it is difficult to make such estimates, I feel safe in stating that if he was correct, the bird has increased since his time. The population, according to Mendall, has appeared remarkably static in the past 15 years.

Lesser Common Loon

Colymbus immer elasson Bishop

Two records for specimens referred to this race. A bird in winter plumage was taken on December 6, 1881, at Cutler, Washington County, and is now in the N. A. Eddy collection at Yale University. The second specimen, a female in nuptial plumage, was taken on May 22, 1888, at North Haven, Knox County, and is in the Everett Smith collection in the Portland Society of Natural History (Norton).

Remarks. The first specimen was recorded by Smith (1882–83: 223) as *Colymbus arcticus,* the occurrence of which Knight (1897d: 134) discredited, but later reinstated (1908b: 27). Then it was referred to *G. arctica pacifica* by Hersey (1917: 285), and later to *G. i. elasson* by L. Bishop (1921: 366).

Considering the variation in size of *Colymbus immer,* I question the advisability of recognizing any subspecies, although *elasson* is still (November, 1948) retained for inclusion in the next edition of the *A. O. U. Check-List.*

Pacific Arctic Loon

Colymbus arctica pacifica (Lawrence)

Hypothetical. One was reported seen on May 16, 1947, at McCurdy Pond in Bremen, Lincoln County, by C. F. Lyman, jr. (1947).

Red-throated Loon

Colymbus stellata (Pontoppidan)

Transient, common in spring and fall along the coast and rare in fall on fresh water; *non-breeding summer resident,* occasional on salt water and two fresh water records; *winter resident,* uncommon on inshore marine waters.

Spring. Norton's records indicate migration as occurring from

April 13 to May 24. On May 27, 1879, thirteen birds were seen flying together at Scarborough (Smith).

Fall. Migration takes place from about September 22 to November 17 (Norton).

Summer. I find 18 records from June 5 to September 9, evenly distributed between these dates, from 1878 to 1946. Of these, two are for fresh water, as follows: one seen, July 4, 1926, in the mouth of Harriseeket River, Cumberland County (Rich); and one, June 6, and two, June 10, 1945, at Pocamoonshine Lake, Princeton, Washington County (J. M. Dudley).

Winter. At this season these birds are sociable and, when present in Maine, are usually found in small loose flocks in inshore waters.

Ecology. This is an inshore bird on salt water, feeding in depths of about 6 to 40 feet. Inland occurrences have been on lakes, and sometimes on ponds too small to accommodate the Common Loon.

Remarks. This loon rarely is seen in Maine in nuptial plumage. Albinism has been noted as follows: one shot, June 22, 1896, at Small Point, Sagadahoc County, which was pure white except for a few brown spots on the back (Spinney *in* Knight, 1897a); a pure white bird taken in December, 1900, in Casco Bay (Knight, 1908b: 28); the July 4 record cited above under Summer was an albino; and one having unmarked plumage and whitish bill and feet, shot near Stonington, Hancock County, and brought to Norton on October 28, 1936.

As far as I can determine, the transient and winter population is about the same as in the 1870's, during Everett Smith's shooting days, but their numbers apparently were fewer for a decade or two at the turn of the century.

Family PODICIPITIDAE

Holboell's Red-necked Grebe

Podiceps grisegena holboelli (Reinhardt)

Transient, in spring and fall, uncommon to sometimes common on salt water and of lesser occurrence on inland waters; *winter resident,* uncommon to sometimes common on salt water and in lesser numbers inland until driven out by ice; of rare *summer* occurrence inland and one salt water record.

Spring. Although data are inadequate, the spring movement apparently occurs from late March into early May. On May 21, 1897, Brewster (1924: 35–36) saw a pair in nuptial plumage on the New Hampshire side of Lake Umbagog.

Fall. Birds begin to appear on salt water about September 23 (very rarely in August), and numbers increase through October and into November. Early dates are for one seen on August 18, 1941, in Muscongus Bay, and three seen on September 7, 1936, at Scarborough (A. W. Kuschke, jr.).

Summer. In addition to rare inland occurrences, one was seen on July 1, 1919, at Isle au Haut, Knox County, by Dr. Chandler Foot (Forbush, 1925: 7).

Winter. Scattered individuals or small groups are found the length of the coast in inshore waters, and occasionally, individuals are seen several miles from the nearest land. Inland, during December, January, and February, it is not unusual for these birds to be picked up from the snow. Apparently they linger about open water till frozen out and, forced to move, lack the ability to make their way to other open water.

Ecology. On salt water this grebe is found both in sheltered and fairly exposed waters. Inland it occurs on bodies of water varying in size from small streams to the largest lakes. It is a sub-surface feeder, probably getting most of its food near the bottom, in under 30 feet of water. It sometimes associates with the Horned Grebe in migrations and winter.

Remarks. The former breeding of this bird on the New Brunswick side of the St. Croix River seems well attested by Boardman. In a letter dated August 25, 1869, he mentioned "a little muddy lake [? Kendrick Lake] about two miles" from where he lived in Milltown, New Brunswick, "where several kinds of grebes breed. . . . The Horned and Dab Chick are most common, while a few Red-necked breed" (Boardman, 1903: 242). In view of the ecological requirements of this bird, however, his statement (ibid. 315) that it "breeds on islands," if he meant those at the mouth of the Bay of Fundy, is open to question. Perhaps he meant islands in ponds.

On April 19, 1941, at Thunder Hole on Mt. Desert Island, Norton observed one of these grebes alternately feeding and preening. It made several dives of long duration, once submerging for 78 seconds in water of unknown depth.

It is well known that the gizzards of grebes generally contain some feathers. The gizzard of an unusually fat female of the present species, shot December 23, 1896, in Knox County waters, was full of feathers (Norton).

Crested Grebe

Podiceps cristatus Linnaeus

Erroneous report. This European grebe was accredited to the North American fauna for many years. Boardman (1862: 131) included it in his list for the Calais region, and Samuels (1867: 560) repeated the error. Later, however, T. M. Brewer (1875: 454) pointed out that Boardman had never seen the bird and occurrence in North America was doubtful. Boardman probably would not have listed it had he not found that Audubon treated it as a North American bird.

Horned Grebe

Podiceps auritus Linnaeus

Transient, common (sometimes numerous to abundant) in spring and fall coastwise, and uncommon to sometimes abundant in fall inland; *winter resident*, common to abundant coastwise; *non-breeding summer resident*, rare on salt water and inland.

Spring. Migration begins in late March, with the main movement in April, and continues into May with two records for May 16, of different years, at Scarborough.

Fall. Some years a few birds arrive along the coast the last week in September, but ordinarily they do not occur regularly until after October 6. Migration extends into November. An early record is for a bird seen September 19 to 22, 1946, at Jackman, Somerset County (W. Foerster). Helmuth (1920: 256) saw "nearly 500" in the harbor at Machiasport, Washington County, on November 1, 1917. For Lake Umbagog, Brewster (1924: 37–41) gave October 2 to 25 occurrences, with interesting observations on habits of migrants.

Summer. Single individuals have been seen on salt water in June, July, and August. For a discussion of breeding, see Remarks.

Winter. These grebes are found singly, in pairs, or small flocks all along the coast, including harbors, about islands, and off beaches. The population varies considerably from year to year. A great many are seen some winters off the York County beaches.

Ecology. On salt water this species shows no preference for bottom type, feeding over sandy, muddy, or rocky bottoms. It generally feeds in rather shallow water, about 5 to 25 feet in depth, and often travels with the tide. Transients occasionally are seen in offshore waters. As this Grebe is a strong flier, occasional individuals are able to land and take off from rather small, sluggish streams.

This is the most common and social of our grebes.

Remarks. That the Horned Grebe formerly bred just across the border in New Brunswick was shown by Baird, Brewer, and Ridgway (1884, 2: 433) who wrote that birds of this species were "not uncommon in the summer in the vicinity of Milltown, N. B. In the summer of 1873 he [Boardman] obtained a female with a brood of chicks." This was probably at the same muddy lake referred to by Boardman (1903: 242) in the quotation I have given under Holboell's Red-necked Grebe. Confusion in localities resulted in accrediting Boardman's breeding data to Maine by such writers as Knight (1879d: 13; 1908b: 21), G. M. Allen (1909: 2), and Forbush (1925: 9).

Norton made notes on the length of submergences of this grebe when feeding, as follows: one bird, over mudflats with not more than 6 feet of water in a sheltered cove at Isle au Haut, Knox County, March 21, 1939, submerged 15, 23, 23, 24, 24, and 23 seconds; another, off a rocky shore of the same island and in about 21 feet of water, March 28, 1937, submerged 46 seconds; and a third, off a sandy shore in about 12 feet of salt water at Scarborough, October 21, 1938, submerged 15, 5, and 25 seconds. Longer dives, in unstated depth of water, were recorded by Mendall at South Thomaston, Knox County, in late July, 1936, four dives being 75, 65, 85, and 78 seconds.

Pied-billed Grebe

Podilymbus podiceps podiceps (Linnaeus)

Transient, rather common in spring and fall on fresh water, and occasional to uncommon in late fall on salt water; *summer resident,* uncommon on fresh water; one *winter* record.

Spring. Migration normally extends from about April 8 to May 19, the birds arriving at inland localities not long after the ice goes out. Latest records are for a bird seen May 26, 1910, and two, five days later, at Great Pond, Cape Elizabeth (Norton).

Fall. Migration occurs from about September 1 into early November. A bird was seen on November 13, 1904, at Westbrook, Cumberland County (Norton *in* Brownson, 1906c: 62). Most salt water occurrences are for late fall when a few birds are driven from inland waters by ice in late October and early November.

Breeding. This grebe has been found breeding from York to Washington Counties and north into Franklin and Aroostook. The nest, a heap of wet vegetation, is built above the water's surface or, in some instances, floats anchored to plants in shallow water. "The nesting season is usually in June, sometimes it is even July before the eggs are laid and these vary from four to ten in number" (Knight, 1908b: 23).

Some eggs must be laid in early May, at least in Cumberland County, for Norton saw a parent with four young, several days old, on June 11, 1939, at Cape Elizabeth. A nest with 7 eggs was found on May 30, 1942, at Seal Cove Pond, Mt. Desert Island (Eckstorm). A brood of "well grown" young was seen on July 4, 1938, at Scarborough (W. M. Holt). The following egg dates from Mendall refer to Portage Lake, Aroostook County: 4 eggs, July 8, 1939; 8 eggs, June 19, 1943; 5 eggs, June 15, 1945; and a set each of 4, 5, and 6 eggs on June 20, 1947.

In Connecticut the incubation period has been recorded as 23 to 24 days, apparently beginning after the first egg is laid (Pease *in* Bent, 1919: 41). The fledging period apparently is unrecorded. Perhaps a second clutch is sometimes laid, for Weston found a nest with two eggs on August 1, 1940, at Seal Cove Pond.

Winter. The one record for this season is for a bird seen by Weston on January 4, 1942, in the open water below the Bangor-Brewer dam.

Ecology. This is a secretive bird in the breeding season, inhabiting the shallow margins of ponds, rivers, and coves in lakes, where it nests among aquatic and semi-aquatic vegetation. At other seasons, it is seen more often in open water but, typically, not very far from vegetation.

Remarks. Knight (1908b: 23) listed the food of this bird as "tadpoles, small fish, small frogs, water insects and similar animal material." I have seen these birds come up with vegetation in their bills, and Norton shot a female at Westbrook on September 14, 1904, which had eaten vegetation and many beetles. According to Brewster (1924: 43) their stomachs are "commonly crammed with soggy masses of feathers."

On August 20, 1941, Norton timed submergences of a bird of the year in a shallow pond in Evergreen Cemetery, Portland, and found a series of dives to be 15, 13, 18, 9, and 10 seconds.

It is unfortunate that so many of these harmless and attractive birds are shot wantonly by gunners.

Family DIOMEDEIDAE

Yellow-nosed Albatross

Diomedea chlororhynchus Gmelin

Two records. On August 1, 1913, one was taken "near [Machias] Seal Island off Machias Bay," by Ernest O. Joy and is in the American Museum of Natural History (Murphy, 1922: 58). In this case of a pelagic bird, wandering so far into the Gulf of Maine near the inter-

national boundary, it seems proper to agree with Murphy (ibid.) that "the record constitutes an addition to the local avifauna of both New Brunswick and Maine." That this particular bird may have been seen farther westward, off Casco Bay, was implied by Norton (1934b: 508) in recording an unidentified albatross seen earlier that same summer by E. D. Rackliff. A female, taken alive a few days before July 23, 1934, among sedges by a brook in East Fryeburg, Oxford County, died in captivity, was mounted (ibid. 507), and is now in the collection of the Portland Society of Natural History.

Family PROCELLARIIDAE

Sooty Shearwater

Puffinus griseus (Gmelin)

Non-breeding (biologically wintering) *resident or visitant* from late spring to fall, fairly common in outer offshore waters and occasionally straying landward to within the outer fringe of islands.

Occurrence. Earliest dates are May 23, 1915 (E. D. Rackliff), and May 24, 1918 (Norton), and latest is September 3, 1913 (Rackliff). These are for birds seen off Casco Bay. They undoubtedly occur later than this date. Dates for Essex County in Massachusetts range from March to October (Townsend, 1905: 109).

Ecology. Both this bird and the Greater Shearwater feed chiefly on the surface, but also dive for objects a short distance below. They feed on squids, fishes, perhaps other swimming organisms, and waste, such as offal or "gurry" thrown overboard when fishermen are dressing their catch. The population of these two birds reaches its peak in August.

Remarks. This species is much less numerous than the Greater Shearwater on the outer banks and pelagic waters, but all records at hand show that it is the more numerous well within the offshore zone. Here it occurs singly, in pairs, and rarely in groups of 6 to 30 (Norton)

Weights of six specimens ranged from 26¾ ounces (a female) to two (? sex) weighing 32½ ounces each (Norton).

This bird breeds in the southern hemisphere in November and December.

Manx Common Shearwater

Puffinus puffinus puffinus (Brünnich)

Status uncertain. Probably of rare occurrence, at least formerly. The skin of one, "taken on the coast of Maine or New Brunswick,"

number 73408 in the Museum of Comparative Zoölogy, was given to the Boston Society of Natural History in 1867 by G. A. Boardman (W. S. Brooks, 1917: 206).

Remarks. Boardman (1862: 130), in his paper on Calais and the Bay of Fundy, wrote of this bird: "Summer. Common on mackerel grounds." T. M. Brewer (1875: 453) took issue with this and stated that "Mr. Boardman has never been able to procure one and has no other reason to suppose it is found on our coast than that the fishermen speak of a smaller kind of Hagdon, an authority altogether too vague." Perhaps, on reading this, Boardman wrote Brewer, for the latter subsequently (*in* Baird, Brewer, and Ridgway, 1884, 2: 385) wrote: "Mr. Boardman informs me that a single individual has from time to time been met with at sea off the coast of Maine and Nova Scotia; but he regards such an occurrence as extremely uncommon, and as purely accidental."

That a small shearwater occurred on the American coast was first reported by Bonaparte. Manx Common Shearwater, formerly under the name *P. anglorum*, subsequently was reported for waters not remote from Maine by several writers. Thus Audubon (1835: 604), who had drawn *P. lherminieri* from life and therefore should have recognized *P. puffinus*, wrote that he had procured the latter "to the westward of the banks of Newfoundland, or between their soundings and the American coast." DeKay (1844: 289) wrote: "Sable Island. Coast of Maine." Lawrence (*in* Baird, Cassin, and Lawrence, 1860: 834) reported that *P. anglorum* was said by Audubon to be "not uncommon off the coast of Maine during summer." Being a contemporary of Audubon's, he may have received information not published by that author.

Manx Common Shearwater is an offshore and not a pelagic species (Wynne-Edwards, 1935: 268).

Greater Shearwater

Puffinus gravis (O'Reilly)

Non-breeding (biologically wintering) summer and fall *resident or visitant*, common in outer offshore and pelagic waters and rare in inshore waters and bays, usually during or after periods of fog.

Occurrence. Whereas this bird probably occurs from mid-May on, the earliest date at hand is for one seen by Norton on June 4, 1918, off Cape Elizabeth. The latest date is for a specimen, taken offshore, November 12, 1882, now in the Everett Smith collection at the Portland Society of Natural History.

Ecology. This species is more pelagic and far exceeds the Sooty in numbers beyond the Gulf of Maine. According to Wynne-Edwards (1935: 259), who cited several persons, there are shearwaters all summer long off the mouth of the Gulf of Maine and as far out as the edge of the Gulf Stream.

Remarks. Two specimens of unstated sex weighed 26¼ and 30¾ ounces (Norton).

Cory's Cinereous Shearwater

Puffinus diomedea borealis Cory

No record. Forbush (1925: 140) cited occurrence in southern New England and added that this bird "doubtless occurs off Maine coast as it has been recorded off western Newfoundland." This warm water species has been seen on the eastern Massachusetts coast, so it must occur rarely (probably after storms) landward of a line drawn from Cape Cod to Nova Scotia. There were two inland occurrences for Massachusetts after the hurricane of September 21, 1938 (Hendricks, 1939), but the birds probably did not arrive there via the Gulf of Maine.

Atlantic Fulmar

Fulmarus glacialis glacialis (Linnaeus)

Four records. A male was taken on the "coast of Maine" in March, 1879 (Anonymous, 1906: 4; G. M. Allen, 1908b). "There is an indefinite record of a Fulmar taken some 12 years ago in Maine which was mounted for the owner by C. Emerson Brown . . . Unfortunately all data of this specimen are missing" (Forbush, 1925: 136). One was shot early in October, 1906, at French's Island Ledges in Casco Bay, and is in the Portland Society of Natural History (Norton, 1936). One, in light phase, was taken in fall, before 1938, on St. John waters in northern Somerset or Aroostook County; it was mounted and in the possession of the person who obtained it, Mr. John Sands of Moose River, Somerset County, when seen by the late Paul F. Eckstorm in 1938.

Remarks. This species is listed as "Winter sea bird; Grand Manan" by Boardman (1903: 316); he took at least one specimen there (ibid. 192). Pettingill (1939a: 318) has shown that it has occurred at other times in waters of that region.

Pintado Petrel

Daption capensis (Linnaeus)

One record. A female, shot in June, 1873, at Harpswell, Cumberland County, is in the Worcester Society of Natural History (Stearns and Coues, 1883: 387; Norton, 1922a).

Family HYDROBATIDAE

Northern Leach's Petrel

Oceanodroma leucorhoa leucorhoa (Vieillot)

Summer resident, common to abundant on certain islands from Muscongus Bay eastward and common to numerous in offshore waters where adults, not in nest burrows, and probably first year non-breeding birds gather; *transient,* numerous in spring and fall in offshore and pelagic waters; may be a rare winter resident in offshore waters. Of rather rare occurrence inland, usually after storms.

Spring. Fishermen state that "kerry chickens" arrive in offshore waters the first week in May. The earliest recorded date for a "petrel," doubtless Leach's, is May 6, 1896, at Seguin (Spinney, 1903b: 53). The first birds arrive at the breeding places about May 8 to 12. Migration probably continues until late in the month.

Fall. As the breeding season advances, the population in offshore waters reaches its peak about August 15 to September 20, then declines until the last birds usually have gone by about October 20. There are a few inland occurrences to November, although it is not certain whether these refer to young out of burrows, late transients, or even winter residents. (See Breeding for late occurrence at colonies.)

Breeding. Burrows are dug under rocks, stumps, tree roots, hummocks, or even abandoned buildings, and Norton (1925b: 47) once found a bird incubating in a hollow log two feet above the ground. The male excavates the burrow which averages 20 inches in length and requires about three days to dig (W. Gross, 1935: 388). The chamber may not be lined, or may contain a rather loose construction of grass stalks, rootlets, twigs, old pieces of bark, dried leaves, feathers, or sheep's wool.

Copulation occurs in the burrow at the end of the excavation period (ibid.) and a single egg is laid the following night. Bent (1922: 146) gave extremes of 50 egg dates in Maine as June 8 and August 8. Norton (1925b: 50) found an egg "noticeably incubated" as early as June 8, [1889, on Outer Green Island in Casco Bay] "indicating that stragglers

begin [laying] by the first of that month. By June 15 many have laid their egg, while every degree of nest-building will be found in progress." On the same island, N. C. Brown found two eggs as late as August 19, 1876, which later hatched (Norton). W. Gross (1935: 385) reported some petrels "just beginning their breeding activities" at Kent Island, New Brunswick, in "September."

Both sexes incubate (Merrill, 1881a: 250; and others). They change places at the nest at night. The incubation period was estimated by Bent (1922: 141) as "not far from five weeks," while W. Gross (1935: 390) knew of continuous incubation for 42 days and, as his observations did not begin with laying, estimated "at least 50 days." On July 16, 1873, Franklin Benner examined a dozen or more burrows on Junk-of-Pork Island in Casco Bay, only two of which contained young, a day or two old, the rest each containing an egg "about half incubated" (T. M. Brewer, 1877c: 81). On the same date in 1885, Norton examined a large number of burrows on Little Green Island off western Penobscot Bay, and found well-incubated eggs but no young. On July 28, 1904, hatching was just beginning at Great Duck Island off Mt. Desert Island (Norton). Hatching on Machias Seal Island (Canadian territory) began on or about August 1 in 1947 (O. Hawksley).

Young may be found regularly in numbers of burrows throughout September in any sizeable Maine colony. Rackliff collected a series of young petrels on Penobscot Bay islands, ranging from about two weeks old to fully fledged, the week of September 27, 1885. A young bird, "probably about a week old, and as lively as he would be in July," was found on Eastern Egg Rock, Muscongus Bay, October 15, 1908 (David, 1908). Rackliff, after camping on Great Duck Island one fall, reported to Norton that after the frost, many young petrels, evidently abandoned by their parents, came out of burrows and niches in sea walls and were found over the island in sunny places. This may have been in early November when Rackliff customarily went there to shoot seafowl. W. Gross (1935: 395) estimated incubating and fledging as requiring a total of "about 120 days." Very likely, the parents abandon the young before they are fledged regardless of how early in the season they are hatched.

Winter. Benner (1874), writing at a time when this bird was much more numerous, stated that petrels occurred along the New England coast in winter. I am not certain that he was on our coast at this season. His report probably was based on hearsay from fishermen and might have referred to late flightless young in colonies in fall, to the old hibernation idea, or to actual occurrence at sea. Knight (1908b: 6) wrote: "While these birds are not numerous off the coast in winter and

a few careful observers have failed to find them, yet I have been told by many fishermen that they have found Cary Chickens outside [offshore] every month in the year, and there is no reason for doubting their statements." Forbush (1925: 146) stated that "a few strays have been reported in winter from the Maine coast." Since this bird has been taken in Greenland waters as late as December 10 and seen in January, February, and March (Wynne-Edwards, 1935: 282, citing Oldenow), and one was seen on January 17, 1940, about 300 miles east of Boston by C. R. Mason, the species may occur in the Gulf of Maine during this season.

Ecology. This is an offshore and pelagic surface feeder. It is gregarious at sea, especially if food is abundant in a limited area, and is a colonial breeder. Nesting burrows are dug in loose soil or peat on the outer treeless or wooded islands, where associates formerly were terns, but now are mainly gulls and eiders. By mid-July, burrows in fields on ungrazed islands are hidden by a rank growth of herbage. The parent birds not incubating very rarely are found within miles of colonies by day. They come inshore at times in the night.

Remarks. In view of the fact that this is a nocturnal bird and its burrows are well hidden, existing data are inadequate to show population trends in detail. The former breeding range in Maine extended westward into Casco Bay, the latest dates of occurrence there being May 22, 1914, when two burrows showing a "decided odor of this bird" were found on Outer Green Island, and at least 1918 on White Bull Island (Norton). The largest colonies, each composed of thousands of birds, were to be found on Wooden Ball and at Seal Island in the Matinicus group, Great and Little Duck Islands off Mt. Desert Island, and Machias Seal Island (now Canadian territory), off Cutler, Washington County (Norton). This bird was known to have nested on 26 islands in former years (Norton and Allen, 1932: 340). In 1931, Norton and Allen found occupied burrows on 12 islands, and surmised that seven others, where they could not land because of the surf, were also inhabited by these birds. The western limit of the breeding range in Maine is now Muscongus Bay where the species may have been absent in some recent years, but a few now breed. They nest on Penikese Island in Massachusetts.

Norton and Allen (ibid. 341) mentioned "temporary periods of scarcity with returns to comparative abundance, which have been observed on several occasions in the past." There has been, however, a steady decline in the overall population since the turn of the century, with some colonies completely exterminated. This decline certainly is due to destruction at breeding places. For example, the colony on Wooden Ball Island was reduced by domestic cats (Wilbur Smith,

1911). These animals have caused much damage elsewhere. The colony at nearby No Mans Land was partially destroyed by the liberation, in 1916, of red foxes (Norton, 1925b: 48), only a few occupied burrows being found there in 1931. Dogs brought to islands by light keepers or picnicking parties have dug out many petrels. These birds cannot survive on the rat-infested inner islands. Minks have done much damage in Muscongus Bay, and Norton (ibid. 47) reported that a Duck Hawk killed petrels there in 1902. Herring and Black-backed Gulls probably have been the most unremitting agents of petrel destruction for the past 20 years. For Green Island in the Bay of Fundy, W. Gross (1935: 382) stated: "By trampling upon the nests of any Gulls which might attempt to establish themselves on the island, the cattle have rid the Petrels, which nest underground, of their worst enemy." He further (ibid. 383) wrote: "One can pick up the regurgitated remains of dozens of birds in the morning along the shore after a night of full moonlight. The awkward, erratic flight of the Petrels makes them easy prey for the Gulls who stand guard along the shore and exact a heavy toll upon the bewildered birds which come fluttering in from the sea at night time. . . Furthermore, Petrels released during the day near a Gull colony were invariably captured and devoured by the more powerful and swifter flying Gulls."

Inland occurrences, listed chronologically by year, are: one taken alive, October 21, 1882, at East Orrington, Penobscot County (Hardy); one taken, November 30, 1888, at the mouth of Presumpscott River, Falmouth, Cumberland County (Norton); one taken on unknown date at Sebago Lake, Cumberland County, and seen in a private collection on October 7, 1894 (Norton); one shot, October 21, 1896, at Lake Pennesseewassee, Oxford County (Anonymous, 1896c); one shot, October 9, 1897, on the Kennebec River at Hallowell, Kennebec County (Knight, 1898b: 14); one taken on unstated date at Lake Auburn and another in the fall of 1900 at Sabattus Pond, both in Androscoggin County (Knight, 1908b: 68); one taken, October 7, 1902, in Westbrook, Cumberland County, in Norton's collection; one seen in July, 1911, at Brewer Pond, Orrington, Penobscot County (Mrs. F. H. Eckstorm); one taken, November 5, 1919, at Merrymeeting Bay (Walch, 1926: 9); and one found injured, September 22, 1938, in a field near Ellsworth, Hancock County, and kept alive for two days (Mrs. E. A. Anthony). The four specimens mentioned by Knight (1908b: 68) as having been taken, after storms, in Penobscot County probably include the 1882 record cited above.

Whether this species feeds by night as well as day is not definitely settled, but appears probable. Digestive tracts contain oily material, having a distinctive odor. Food is not well known, but W. Gross

found Bay of Fundy birds had eaten tiny mollusks and small "transparent squids." Elsewhere, known items of diet include fishes, copepods, and other crustaceans. Collins (1884: 317) reported petrels quartering back and forth like dogs working a scent, when coming to oily matter on the water, but the question of possession of a functional sense of smell is not proved experimentally. This bird can be 'tolled' close to a boat by tossing oily fish livers overboard.

In an article, valuable for its historical data and descriptions of petrel vocabulary, Norton (1925b: 50–51) wrote: "There is a widespread tradition that these birds remain in the ground all winter. We have examined their burrows on a number of occasions during the months of December and February, with a single [negative] result. The outer islands, like mountain tops, are swept quite constantly by winds at or near gale force, sweeping most of the snow that falls away, while the little that becomes lodged in the short vegetation, by the combined action of the wind and sun is soon evaporated or melted, leaving the ground bare for most of the time, and open to the full action of the frost. The burrows become at first open tubes encased in hard frozen earth, and then receptacles for the water of melted snow and rain, which in turn becomes solid shafts of ice.

"The belief that the birds winter in their burrows is very likely founded in part on the fact that numbers of young birds in large colonies, probably forced by hunger, emerge from their burrows late in fall."

Gross (1947g) has shown that this petrel is a long-lived bird. This is a general characteristic of sea birds which have low annual reproductive potentials.

For the benefit of future students, the following corrigenda to Maine literature are noted. Remarks on a very large flock of "petrels" at sea by Judd (1889) probably pertain to Wilson's Petrel. R. H. Howe (1901: 14) was in error when he stated that this species does not come into Penobscot Bay at night. Mention of "Stormy Petrels" at the Duck Islands by Dutcher (1905b: 324) refers to the present species. Remarks about the "nearly depleted condition of one of the largest colonies" by Norton (1906c) refer to Wooden Ball Island. Pearson (1910), in discussing this same island, erroneously called it No Mans Land. References (*in* Brownson, 1906c: 66; 1908b: 48) to Leach's Petrel at Portland are based on Knox or Lincoln County occurrences and were included by mistake. Norton (1934a: 76) was referring to the *former* western limit of the "known breeding range" when he stated that it was Casco Bay.

Storm Petrel

Hydrobates pelagicus (Linnaeus)

Erroneously recorded. The specimen recorded by A. E. Verrill (1863: 234) was taken at Grand Manan, New Brunswick, as shown later by Boardman (1903: 315). The earlier report is the basis for inclusion of this species in the Maine lists of Holmes (1861a) and Hitchcock (1862), and, undoubtedly, for mention of Maine occurrence in the 1931 *A. O. U. Check-List* (p. 15). Elsewhere (*in* Baird, Brewer, and Ridgway, 1884, 2: 405), Boardman reported that this species occurred in the latter part of summer "off the coast of Eastern Maine," but I know of none having been taken. There are a few other references to "Stormy Petrel," but most, if not all, pertain to the two petrels which occur regularly in Maine. As the Storm Petrel breeds in the eastern North Atlantic, however, it might occur in our waters in fall and possibly in spring.

Atlantic Wilson's Petrel

Oceanites oceanicus oceanicus (Kuhl)

Non-breeding (biologically wintering) *resident or visitant* in summer and early fall, numerous in offshore and pelagic waters and uncommon (sometimes numerous) in inshore waters to within view from the mainland, but less often seen in harbors. One inland record.

Occurrence. Earliest dates are for several seen on May 23, 1915 (E. D. Rackliff), and one on May 24, 1918 (Norton), off Casco Bay. By June 5th of some years, they are present in great numbers in offshore waters. The population begins declining in late August and the last birds have left by about mid-September. Norton considered them "abundant" off Casco Bay, September 13, 1916. The latest actual date is September 17, 1903, when a "young male," blown inland by a heavy southeast gale, was taken on Lake Cobbosseconteе, Kennebec County (Swain, 1904b: 16).

Ecology. This rather gregarious petrel is an offshore and pelagic species and, unlike Leach's Petrel, it comes inshore in daylight. Although most of their food is taken on the surface of the water, Norton (1916: 378) wrote: "I have several times seen them dive to the depth of about a foot for sinking food." About five miles east of the Isles of Shoals, on August 15, 1935, P. L. Wright (1937a: 21) saw flocks of at least 25 individuals alight on the surface of the water. Whales were plentiful in the vicinity that year.

Incursions. During the summers of *1921* and *1922*, many Wilson's Petrels came close inshore at various points from Cape Elizabeth to

Penobscot Bay and frequently were seen from the shore of the mainland. Occurrence of such numbers inshore is unusual. The cause most likely was due to a shoreward movement of small marine organisms upon which these birds feed..

Remarks. This species breeds south of the equator. Through a misunderstanding, Audubon mentioned it as breeding on islands off Nova Scotia, and other writers extended this to include Maine. The error persisted for many years until finally corrected by Brewster (1884: 404).

In writing of these birds, Norton (1916: 378) observed: "During frequent excursions of five to twelve miles offshore the past fifteen years, this is the only species I have seen by day. It is a common occurrence to attract twenty to fifty of these birds about a boat at anchor or slowly drifting, in an hour's time.

"If there is any breeze the birds are found flying to windward, and when they find it desirable to work over a small space, after once passing over it, they swing away in a large circle, and again come up from the leeward. . . returning again and again in the same manner. Thus a flock is composed of birds, constantly going and coming, and while fifty are in sight, probably nearly as many more are at hand, preparing to return. On these occasions they are rather silent, never noisy, but a low peeping note is often given."

In unpublished data, Norton wrote of seeing great numbers about Cod Ledges, off Casco Bay, on June 18, 1918: "Soon they were seen in all directions, like swallows in a meadow, flitting busily over the glassy ocean or like a vast throng of butterflies in the summer sun. They kept crossing our wake, feeding on bait thrown overboard, and gathering in little groups. When near enough, they could be heard peeping contentedly. . . Soon we passed through the great scattered flock, even those following in our wake dropping astern, and only scattered ones being seen. . . I could detect no general movement, as of migration, but rather a great body of birds sweeping continually about. It was the largest gathering I have ever seen and all were of this species. All conditions of molt were noted."

Family PHAËTHONTIDAE

Northern White-tailed Tropic-bird

Phaëthon lepturus catesbyi Brandt

One record. A few days after the hurricane of September 21, 1938, an adult was found at East Winn, Penobscot County. It was mounted

by the late Walter Clayton, of Lincoln, from whose estate it was obtained for the collection of the Portland Society of Natural History (Norton, 1943b).

Family PELECANIDAE

White Pelican

Pelecanus erythrorhynchos Gmelin

Visitant, rare in summer (May 28 to August 20 or later).

Records. Boardman first (1862: 130) listed this species as "Accidental. One or two instances," but later (*in* Knight, 1897d: 26; 1908b: 75) changed this to "one seen at Calais [Washington County], it was afterward shot over the line in New Brunswick." "A flock of seven is reported as having been seen in the St. Croix River [Maine-New Brunswick border] in August, 1874, by Captain Worcester, of St. Stephens, N. B." (Baird, Brewer, and Ridgway, 1884, 2: 136). An adult male was taken on May 28, 1892, at Saponac Lake, Penobscot County, about 40 miles NNE of Bangor (Merrill, 1892a), and not the Mattawamkeag River, outlet of the lake, which has once or twice been mentioned as the locality whence the specimen came. This specimen was for many years in the Manly Hardy collection which was sold to the Roger Williams Park Museum, in Providence, Rhode Island. During a storm on June 8, 1897, two of these birds alighted in a field at Eliot, York County (Knight, 1898b: 14; 1908b: 75).

One was taken on an unstated date in 1913 at "Matinicus Light, Seal Rock" [=at or near Matinicus Rock, Knox County] and was purchased from Francis Dana for the Boston Society of Natural History (C. W. Johnson, 1914: 2). It was accessioned in December of that year (Forbush, 1925: 165). One was seen over a period of ten days to two weeks, including the week of August 20, 1945, in Blue Hill and vicinity, Hancock County, by a number of observers (G. A. Waterman).

Brown Pelican

Pelecanus occidentalis subsp.

Four records. "A live Pelican about as large as a wild goose, was taken in the Kennebeck River in the spring of 1826, two miles above Bath [Sagadahoc County]" (Williamson, 1832: 147). In the summer of 1914, one was seen at Hog Island, in the Metinic group, Knox County (Rackliff). In early November of that year, one, possibly the

same bird, was seen several times near Jacquish Ledges off Baileys Island in eastern Casco Bay (E. Sinnett). Several times in September, 1922, one of these birds was seen at Seguinland, in Georgetown, Sagadahoc County (Dr. H. F. Twitchell).

Remarks. The specimen captured alive at Bar Harbor in the fall of 1900 (Dill, 1901) was one of several brought from Florida and raised in captivity at Castine, Hancock County (Norton, 1916: 379; May, 1916). On April 3, 1938, another escaped captive was found dead at Falmouth, Cumberland County, and was taken to the Portland Society of Natural History (Norton).

Since a subspecies from the Lesser Antilles also is recognized, and birds might be blown northward by hurricanes from the ranges of two races, I have used a binomial scientific name above.

Family SULIDAE

Gannet

Morus bassanus (Linnaeus)

Transient, common to sometimes numerous, in spring and fall, in offshore waters and, during gales, in inshore waters; non-breeding *summer resident* (mostly immature birds), uncommon offshore and occasional inshore; perhaps an occasional winter resident. One definite inland record.

Spring. Most transients are seen from April 13 to May 14, with stragglers—a few adults and a larger number of immatures—seen until about May 24. Early records are: Jeffreys Bank and vicinity where fishermen saw Gannets in abundance March 15 to 20, and 24, and in lesser numbers, March 29 to April 3, 1920 (Norton); and one seen by Spinney near Seguin on April 8, 1903.

Fall. Most birds pass along our coast from late September to November 15, the peak of the flight occurring in the last third of October, and stragglers seen to at least November 30. Transients were observed passing Seguin as early as September 18, 1897 (Spinney).

Summer. A fair estimate of June and July occurrence would be 12 to 15 birds, most of which are 'Gray Gannets' or immature birds, only one or two being adults.

Winter. Although several early writers stated that the gannet was a common winter resident, I have only four sight records. These are for December and early January. Probably the bird occurs more often, however, than these few records would seem to indicate.

Ecology. This bird is typically an offshore migrant and wanderer in

our area, being most numerous over outer banks and shoals. It is not gregarious, but numbers will gather about when one bird dives repeatedly for food in a given area. The gannet plunges for fish from a considerable height (usually 50 to 80 feet), submerges completely, and is reported to descend sometimes quite a distance below the surface.

Remarks. Sometimes flights are forced inshore by gales. This was said by Audubon (1838: 225) to have resulted in a few inland occurrences in Nova Scotia and Maine. Hamlin (1865: 173) mentioned a specimen taken inland in Kennebec County.

The digestive tract of an immature male, shot November 15, 1881, off Casco Bay, contained remains of sea urchins (N. C. Brown); perhaps these echinoderms had been eaten by some fish which the bird had caught.

The "*mackerel*, or *fishing Gull*" mentioned by Williamson (1832: 145) refers to this species.

These birds formerly nested on Gannet Rock in the Grand Manan archipelago, New Brunswick. A. E. Verrill and T. M. Brewer found that the colony had dwindled to one or two pairs in 1859, but "was probably not entirely deserted until about 1866" (Gurney, 1913: 311). They also bred formerly near Yarmouth, Nova Scotia (Bent, 1922:228).

Family PHALACROCORACIDAE

European Cormorant

Phalacrocorax carbo carbo (Linnaeus)

Winter resident, common to numerous from Eastport, Washington County to Casco Bay and uncommon westward; *transient,* common to numerous in spring and fall all along the coast; non-breeding *summer resident,* uncommon from Washington County to Muscongus Bay and occasional westward. One inland record.

Fall. Migration occurs chiefly from about September 12 to October 20. Two birds, believed to have been transients, were noted as early as September 5, 1913, in outer Casco Bay (Norton).

Winter. Small groups occupy various roosts—often sites where the double-crested species roosts or nests in summer—and make regular flights from these places to feeding areas. At the present time, 60 to 100 birds is a large number for any one roost, and such are reported only east of Small Point, Sagadahoc County.

Spring. Migration occurs throughout March and to about April 24, the northward withdrawal overlapping the arrival of the Double-crested Cormorant.

Summer. At present, ten is a goodly number to see at any one roost (usually shared with its smaller relative), from Knox County eastward. To the west only scattered birds or very small numbers have as yet been reported regularly occupying a roost.

Ecology. The ecological requirements of this species are fairly similar to those of the Double-crested Cormorant. The European frequents more exposed outer shores and is seldom seen in sheltered harbors, coves, and reaches. (See Ecology under Northern Double-crested Cormorant.)

Remarks. References to the breeding of this bird in adjacent New Brunswick waters began with Samuels (1867: 535) who wrote: "The Grand Manan is the most southern breeding-place of this bird in our neighborhood. There it builds a large nest of seaweeds on shelves of steep cliffs or in crevices of the rocks." I am not aware that he visited the island, but T. M. Brewer, who visited there in 1850 and 1859, stated (1875: 448): "Rare summer resident (Maine); migratory." He omitted mention of Grand Manan. Later (*in* Baird, Brewer, and Ridgway, 1884, 2: 149) he stated: "This species formerly bred at several points on the New England coast, from Nahant [Massachusetts] northward; but has long since been driven away, although a few of these birds still breed on rocky cliffs in Frenchman's Bay [Maine] and the Bay of Fundy." I do not think he had first-hand Maine data on summer occurrence. About 100 non-breeding birds used to roost all summer, in the 1860's, on Robinson's Rock, Islesboro, Waldo County (Rackliff), and unpublished notes of Manly Hardy indicate that, for 1875–1885, adult and flying immature birds were by no means scarce in summer in Jericho Bay and eastward, but Hardy never hinted at probable breeding. It would seem therefore, that either a small and irregularly breeding population did exist in early years, or that the presence of non-breeding birds gave rise to reports of breeding.

At the present time the two species of cormorants breed together as near as eastern Nova Scotia and, with more European Cormorants spending the summer each year in Maine waters, Gross (1944c: 517) has suggested "that we be on the watch for its nesting on the islands on the Maine coast."

The one inland record is for a bird shot in October, 1896, at Chemo Pond, Penobscot County, and recorded by Knight (1879d: 26).

Northern Double-crested Cormorant

Phalacrocorax auritus auritus (Lesson)

Summer resident, numerous to very abundant (over 1,000 pairs in one colony) on coastal islands and rocks, with numerous 'shag roosts'

occupied largely by immature birds, and uncommon *visitant* (? all immature birds) inland; *transient*, abundant coastwise in spring and fall, with many birds making flights for considerable distances inland on the larger waterways (numerous in fall at Merrymeeting Bay). No certain winter record.

Spring. Most transients along the coast are seen between April 10 and May 4. Early records are for 40 seen on March 15, 1937, at Bar Harbor, Mt. Desert Island (G. Swanson), and a single bird seen on March 24, 1941, at Schoodic Point, Hancock County (Weston). Norton considered migration completed by the end of May in the Portland region, the late May flocks being mostly immature birds. Early records which may be considered inland are for three seen on April 17, 1944, at the head of tidewater at Brewer (Weston), and several seen on April 26, 1942, at Merrymeeting Bay (Norton). Some birds follow the main rivers inland in late April and very early May, but most return to salt water within a short time.

Fall. "In Maine, there is little evidence of migratory tendencies among the resident birds until the last of August or the first of September. During the last two weeks of August, however, there is usually a greater abundance of cormorants in the various bays than would be occasioned by the resident adults and their young—this fact indicating the arrival from the maritime provinces" (Mendall, 1936b: 27). The latter statement also is indicative of a premigration dispersal when some birds, immature and adult, may go in any shoreward or landward direction. Norton noted this movement on the coast when he saw several birds on August 16, 1907, near Seguin, at a time when none bred in Maine or roosted that far westward. This dispersal probably accounts for the majority of birds seen on inland waters at this season.

The main southward movements "reach a peak during September and October, and gradually fall off during November. A few late stragglers may be observed in December but such instances are rare" (ibid.). Late inland records are for four seen on September 17, 1942, at Portage Lake, Aroostook County (Weston), and one shot "about November 18" [actually November 10] in 1895, at Kingman, Penobscot County, and presented to the University of Maine collection (Knight, 1896c: 178).

Flight years. Forbush (1925: 162) stated that after this species had a "good breeding season in the North," it passed along the New England coast in "great numbers" in autumn. He reported a large flight in *1905*, and the greatest he had ever seen in *1921*.

Breeding and summer. Although there are a few colonies in Maine where trees are used for nest sites, the majority of these birds nest on the ground where sites range from shelves on steep cliffs to the more

level areas on islands. Time required for construction of nest varies, a nest which has been used the year before needing only about two days' work and a new one about four. Both sexes are active in the building, although after the foundation is laid, the male's role generally is restricted to bringing material to the female. The foundation (rockweed, kelp, debris) is of finer material than the upper part (sticks, weed stalks, stranded flotsam), and the lining may consist of feathers, grass, algae, or other available material. The nest is added to throughout the breeding season.

Usually four eggs (less commonly three, and two to six noted) are laid beginning right after the nest is finished by the second week in May. They are laid at any time of the day, with sometimes an interval of more than one day between layings. Incubation, by both sexes, requires approximately 25 days. Young leave the small nest territory at three to four weeks of age and join in flocks, returning to nests to be fed by regurgitation. Before reaching flying age at the end of the sixth week, they may wander throughout the entire colony. One brood is raised yearly. (Summarized from Mendall, 1936b.)

Non-breeding birds are to be found occupying roosts all along the coast, but principally east of Casco Bay. As a rule, immature birds are not tolerated in breeding colonies, although a few may sometimes attempt to stay about. Mendall (1936a) reported one of these, believed to have been a male, building a nest, engaging in courtship, and guarding a territory in a colony.

Ecology. Both our cormorant species are typically littoral birds. When feeding, they often fly unnecessary distances, keeping to winding water routes, rather than cross land or even extensive water areas. A round trip for food may be as much as ten nautical miles (Norton, 1923a: 16). Both species swim and dive like loons, catching their prey near bottom, as revealed by items eaten (see below). Practically all fishing is done in less than 30 feet of water. Although some writers have stated that these birds sometimes plunge from the air like kingfishers, confirmation of this is lacking.

Tree nests generally are in dead trees or trees soon killed by the excrement of the birds. With two reported exceptions, ground nests in Maine have been on bare rocks or soil lacking all vegetation. Mendall had a captive young bird that had such a strong negative reaction to walking on grass, it would take flight to avoid this. In a crowded colony some nests are very close to each other, although ideally they are a few feet apart. Numerous published photographs show the fairly even spacing of nests and minimum desirable territory. Large colonies are often the result of expansion of the several nest-groups characteristic of 'young' colonies. Most colonies are used as

roosts for some years prior to their becoming actual breeding grounds. At places well inland, birds usually are found on sizeable lakes. Numbers occur regularly at Merrymeeting Bay where there are suitable roosting places, although I am of the opinion that most of these birds return to salt water at night.

These birds sleep on land and not, as some people believe, on the water. Herring Gulls, Black-backed Gulls, and American Eiders are breeding associates, although they nest somewhat apart from the cormorants. The two gulls rob nesting material from the cormorants and also eat their eggs and young. (Summarized from Mendall, 1936b, with additions.)

Remarks. Mendall (1936b: 5–13) has given an account of the early history of this species in Maine, the greater part of these historical data having been supplied by Norton. Through confusion of species, the definite status of this bird was not too clear from the early literature. In 1883, Smith (1882–83: 185) wrote that this species was abundant along the coast during migrations and although some remained throughout the summer, none bred. If any birds did breed during the decade of 1880–1890, they must have been restricted to isolated ledges hard of access, for no records can be found in the fairly extensive literature of that period. Before 1900, great reductions were made in these birds' numbers by fishermen who used them as bait, and by others for general target practice.

Charles K. Reed took eggs of this species, probably in June, 1892, near Isle au Haut, Knox County (Knight, 1896b: 13). Undoubtedly these were secured on adjacent Black Horse Ledge, for Knight later (1900b: 6–7) told of visiting this ledge, giving nesting data for 1893, 1895, and 1896. In 1896, there were but two nests, one of which was incomplete and the other having been robbed. He was informed of the birds being present but not breeding in June, 1899.

Norton frequently inspected the coast, including islands, from Portland to the New Brunswick border, between the years 1902 and 1923, without finding any nesting cormorants. From 1905 on, 'shag roosts' were noted. That three birds were "nesting" on Black Rock near Cone Island, off Addison, Washington County (Norton, 1907d: 325) was an error for "roosting."

Mendall (1936b: 12) suggested that the Double-crested probably began nesting again in Maine about 1925. In a cruise along the coast from Cutler, Washington County, to Saco Bay from June 23 to July 14, 1931, Norton and Allen (1931: 591) found this species nesting as follows: 1,000 on Old Man Island, off Cutler; 100 on Pulpit Rock off Jonesport, Washington County; 40 on Spoon Ledge near North Haven, 600 on Marblehead Island near Owl's Head, and 8 on Old

Hump Ledge off St. George, all in Knox County. To the west, they found roosts only.

To discuss the subsequent great increase of this species in detail is beyond the scope of this paper. The reader is referred to Mendall (1936b: 11–12) and to the detailed statistics of Gross (1944c). The latter, for 1944, listed colonies having, as a total, "well over 10,000 pairs of nesting birds" and extending along our entire coast. According to Cruickshank, over 2,100 pairs nested in Muscongus Bay in 1946.

Of bird remains found in a kitchen midden at Old Point, in Lamoine, Hancock County, cormorant (species unstated) bones were found to be among the more numerous (Moorehead, 1922: 166). Several early writers reported the manner by which Indians secured cormorants of unstated species for food. Josselyn (1674; 1865b: 80–81), who lived at what is now Scarborough, wrote that "the *Cormorant, Shape* or *Sharke*" roosts at night "upon some Rock that lyes out in the Sea, thither the *Indian* goes in his Birch-*Canow* when the Moon shines clear," and after killing the "watchman" of the birds, "he takes them up as he pleaseth, still wringing off their heads; when he hath slain as many as his *Canow* can carry, he gives a shout which awakens the surviving *Cormorants*, who are gone in an instant."

In his study of this species, Mendall (1936b: 109) tabulated the food from 519 regurgitated meals and found that the greater part consisted of cunner, sculpin, and gunnel. Obviously the birds do not compete with man for the more economically valuable forms of marine life. They are a nuisance, however, in that they rob weirs, and I have heard fishermen complain of the loss of fish by reason of the birds coming into the weirs and thereby forcing the catch to crowd to the bottom where many fish suffocate.

The great rise in population has brought about more of this type of molestation and, as a consequence, an increase of complaints from weir fishermen. As a result, the U. S. Fish and Wildlife Service, through an agreement with the Maine Department of Sea and Shore Fisheries, began a control program in 1944 which consists of spraying the eggs with an oil emulsion to prevent hatching, as is done with the Herring Gull. The number of eggs sprayed in Maine is: 17,679 in 1944; 21,871 in 1945; 11,436 in 1946; 25,328 in 1947; and 16,162 in 1948; making a total of 92,476 eggs. No control of the species is indicated as yet.

The last word regarding roles of the sexes in courtship is yet to be written. Although H. F. Lewis (1929: 23–25) maintained that the male was the actively displaying bird, he presented some evidence to the contrary (ibid. 25–26). Mendall (1936b: 37–40) agreed with Lewis on the whole, but indicated that some doubt remained, especially as

regards posturing on the water. In view of the fact that the sexes are quite similar, that males aid in nest-building, and that there is a sex recognition performance where one bird touches the other or beaks are locked (described by Mendall, ibid. 38), it seems likely that the sexes may change roles during some phases of display.

The reason why cormorants so often hold their wings spread while perching is still a moot point. Of the many explanations offered, I would favor that of Norton (*in* Mendall, ibid. 100), who thought it a part of display "probably divested of the emotion of sex" during most of the year. A comparable example might be the year-round nodding of the Noddy Tern.

Cormorants often keep their beaks open somewhat, even in cool weather, and the throat pouch quivers, reminding one of a dog panting. Mendall (ibid. 98–99) stated that there appeared to be no stimulus involved other than the mere opening of the beak. It may be that they, like gannets in having very small nostrils, use this device to facilitate breathing. Gannets are given to frequent gaping.

As is well known, cormorants fly in lines like geese. A September flock of these 'geese' winging southward is reported quite regularly by the local press as forecasting an early winter!

Mendall (ibid. 125–126) gave a series of submergence records, the longest being 41 seconds in unstated depth of water. Two series of dives in ten feet of water averaged 20.2 and 22 seconds, with 26 dives ranging from 16 to 30 seconds. The longest series was for 16 feet of water and averaged 27.7 seconds with 14 dives ranging from 28 to 33 seconds.

Boardman (1862: 130) stated that this species occurred in winter in the vicinity of Calais and in the Bay of Fundy. Although a specimen may have been taken at that season, to imply regular winter occurrence was an error, and later (Boardman, 1903: 313) was altered to mere mention of occurrence in migrations. The earlier report has been repeated by Bent (1922: 250) and the *A. O. U. Check-List* (1931: 22), and probably was the basis of Knight's (1908b: 74) mention of winter occurrence.

Family FREGATIDAE

Man-o'-war-bird

Fregata magnificens rothschildi Mathews

Two records of birds shot, but neither preserved.

"Mr. Purdie's manuscript informs us that a specimen was taken, but not preserved about twelve years ago [about 1871], at Booth Bay

[Lincoln County], Maine" (Stearns and Coues, 1883: 342). In 1903, Daniel French of Jonesport, Washington County, informed Norton that in 1893 he shot a specimen as it was flying over Libby Island off Machiasport in the same county. It was sent to Charles Parker, taxidermist at Machias, who, in a letter dated June 14, 1914, told Norton, "I remember of Mr. French shooting the Frigate Bird, but if I remember rightly it spoiled and never was mounted." Forbush (1925: 171) referred to this specimen, citing an item in the *Boston Evening Transcript* of October 19, 1893, which recorded that the bird had been shot "some time ago" at Machias.

Family ARDEIDAE

Northern Great White Heron

Ardea occidentalis occidentalis Audubon

Hypothetical. Sight records, probably for the same individual, are for September 4, 1948, at the Presumpscot River, Falmouth, Cumberland County, by Rich, and on October 6 of the same year at Berwick, York County, by Dr. Anne Perkins (Gross, 1948a: 68). It would seem to me that a very large white heron most likely was a more or less albinistic Northern Great Blue Heron.

Northern Great Blue Heron

Ardea herodias herodias Linnaeus

Occasional *resident* (probably locally migrant) in coastal counties eastward into Waldo; *summer resident,* occasional to numerous, with most of the breeding colonies on inshore islands and the adjacent mainland; *transient,* common in spring and fall in the southern half of the state and less so northward.

Spring. Since numerous March records are for coastal counties, these may be for wintering birds. There is a definite migration about April 1 to 11, and birds continue to arrive until April 24 or later in coastal counties. Chamberlain has noted arrivals April 11 to 21 at Presque Isle, at which time the ice still covers most of the lakes and ponds, and only brooks have open water.

Fall. Since young birds are found widely scattered in late August and early September in areas where heronries do not exist, obviously there is a dispersal prior to migration. The main southward movement occurs from about October 5 to November 12. There are numerous

occurrences as late as December 5 to 19 on inland waters of the southern half of the state. Later the freeze-up forces these birds to move to salt water where some remain and others fly farther south. The latest date for Aroostook County is November 9, 1941, at Presque Isle (Chamberlain); for Washington County, December 6, 1924, near Machiasport (Rich); and for Hancock County, December 4, 1945, at Surry (Mrs. E. A. Anthony). An interesting record is for one seen about December 14, 1939, on offshore Monhegan (Mrs. J. A. Townsend), where this species also occurs earlier in migration.

Breeding. Although solitary nests are found, usually this bird breeds in colonies of a few to over a hundred pairs. Larger Maine heronries have been reported, including one containing "about 300 nests" on a Muscongus Bay island in 1927 (Backus, 1929), but usually there are about 25 to 60 nests. Fairly substantial nests of sticks, lined with twigs, are built from 15 feet above ground to quite near the tops of tall trees. I have seen 11 nests in one tree in a Casco Bay colony. Nests are used, probably by the same birds, on successive years and material added (Knight, 1898a: 12), until they fall or are blown down.

Records for Maine indicate clutches of three to five eggs with four the usual number. Laying begins by late April. On May 5, 1935, one set of five fresh eggs and another of four, slightly incubated, were collected at Georgetown, Sagadahoc County (Harris). Eggs with living embryos have been found the last week in June. Incubation, by both sexes, is about 28 days (Bent, 1926: 106), as determined outside of Maine. Nearly all young had hatched on June 4, 1922, in a colony of "about 50" nests near Boothbay, Lincoln County (Norton). Feeding is by regurgitation. Probably 50 days are required for fledging. One brood is raised yearly.

Winter. Audubon (1835: 88) reported this bird wintering in Maine, and at least 15 such instances are known for the present century. Most are for Cumberland, but York, Sagadahoc, Knox, Lincoln, and Waldo Counties are included. In mild winters a few birds probably remain on tidewater all along the coast.

Ecology. This heron, feeding on a wide variety of aquatic and shore life, frequents the shores of ocean bays, islands, coves, flats, streams, lakes, ponds, marshes, and ditches. Some feeding is done on high ground and uplands near marshes where food may consist of insects, mice, and snakes. Although this bird feeds both by day and night when not molested, it tends to be crepuscular if persecuted. Most heronries are in woods of deciduous or coniferous live or dead trees, and any combination of these. Nests are in fairly open, exposed sites since this large bird needs more room for movement and is less partial to shade than the Night Heron, which often nests in the same heronry.

A colony sometimes is several miles from the nearest feeding place, birds of both species flying over a regular route to and fro, as I have observed at Brunswick, Cumberland County.

Wintering birds find open water at tidewater, but are probably forced to eat almost any obtainable animal food for sustenance.

Remarks. The population of this heron has diminished over the years. Cyrus Eaton (1851: 6–7) stated that these birds were seen much less frequently at the time he wrote than thirty years before in Knox County. Brewster (1924: 195–198) noted a decrease of birds in the Umbagog region, Oxford County, from 1885 throughout his subsequent visits to 1909; his account gives a sad picture of human vandalism and wanton destruction of heronries. Kendall (1902a: 7) wrote of the decrease in Cumberland County, from 1880 to 1900, and recalled an incident where crews of two schooners shot herons and salted the meat—probably to use as fish bait. With protection, beginning at the turn of the century, there was a marked increase in population over three decades (Norton), but there has been a slight decline since then.

Colonies are unstable and constantly shifting location. Some apparent reasons for this include: predation on eggs and small young by Crows, and Ravens, human molestation, and unstable forest conditions, including lumbering operations.

Although this heron sometimes is accused of serious and widespread predation on game and food fishes, I am not aware that such charges ever have been proved in Maine. Admittedly some birds do local damage at hatcheries. It is extremely doubtful that these herons, so often seen perching on weirs along the coast, get much of their food at these places.

Rosier's mention (1605; 1887: 159) of "Hernshawes" in what is now St. George, Knox County, may be considered the first Maine record of this species.

American Egret

Casmerodius albus egretta (Gmelin)

Visitant, rare in spring and uncommon (common at a few localities some years) in late summer and early fall in western coastal counties, but diminishing eastward to a status of only occasional in Washington County; rare inland.

Spring. All records are: one shot on April 7, 1891, on Great Cranberry Island, Hancock County (Smith *in* Knight, 1897d: 39); one shot a few days before April 24, 1875, at Scarborough (N. C. Brown, 1875); a female shot on April 23, 1911, at Scarborough (Brock, 1912); one

shot, probably in Millbridge, Washington County, and received at a Bangor taxidermy shop on May 3, 1906 (Knight, 1906b); and one seen on May 22, 1945, at Ocean Park, York County (Mrs. G. Webb).

Summer and fall. Most occurrences are in August and the species now is seen in that month in at least three out of five years. The earliest record is for one seen on June 16 and 17, 1929, at Ogunquit, York County, and recorded by May (1929: 339), and the latest is for one seen on October 10, 1948, at Ogunquit, by C. Street.

Ecology. In Maine this gregarious bird frequents salt marshes and tidal flats, being found less often about fresh water. The commonest associate is the Little Blue Heron.

Remarks. From 1854 to 1905 there were seven reported occurrences (eight individuals); 1906 to 1910, no records; and 1911 to 1933, forty-six individuals noted in 14 different years. Since then it may have occurred every year, although I lack records for six of them. In August, 1946, there was a flight, about 20 individuals being seen by various observers. Some of these went as far east as Acadia National Park on Mt. Desert Island. In 1948 at least three times as many occurred as in 1946, with birds noted from July 14 to October 10. Relatively high numbers were present throughout August and most of September. Most were seen in coastal York and Cumberland Counties, but some went considerably farther eastward and northward. Gross (1948a) has given some data on this flight, but more will be published later. [Later reports indicate that perhaps nearly 200 individuals were present.]

Inland records of interest are: a bird in juvenal plumage shot on August 9, 1887, on Kennebago Stream, Rangeley, Franklin County (Brewster, 1924: 203); two seen (one shot) on August 20, 1896, at Pleasant Pond, between Richmond, Sagadahoc County, and West Gardiner in Kennebec County (Powers *in* Knight, 1897d: 39); and at least seven which I saw on September 15, 1948, on the Kennebec River about six miles below Augusta.

The occurrence of this species in Maine is due, for the most part, to an extensive post-breeding dispersal prior to returning south to winter within the breeding range. The increase in numbers is a result of protection, especially on the breeding grounds. Compare this bird with the Little Blue Heron, which has shown similar dispersal behavior and population trends.

Of the several records for the Grand Manan archipelago, one is for an adult on the early date of April 5, 1936 (Pettingill, 1939a: 321), and another for an immature bird shot on the late date of November 3, 1878 (Deane, 1879c).

Snowy Egret

Leucophoyx thula (Molina)

A small number in 1948 was seen, in late summer, mainly in coastal portions of York and western Cumberland Counties, usually associating with American Egrets and Little Blue Herons. In the data given by Gross (1948a), the earliest occurrence was one in "July" at Ocean Park, Old Orchard Beach, York County; the latest was five on September 10 at Prout's Neck, Scarborough, Cumberland County; and the maximum number identified at any one time was seven at the latter place on August 11. Probably not over a dozen individuals were in Maine during this flight year.

Remarks. On page 69 of the July, 1945, mimeographed issue of the *Bulletin of the Maine Audubon Society* there is mention that "Mrs. Genevieve D. Webb saw a Snowy Egret" on May 22, 1945, at Ocean Park. Mrs. Webb writes me that this was an American Egret.

Knight (1908b: 649) stated that a specimen taken by Boardman at Grand Manan had been accredited to Maine by several writers. An example of this was Baird, Brewer, and Ridgway (1884, 1: 30), who stated that the species was found in summer "as far to the northeast as Calais, Me."

Northern Little Blue Heron

Florida caerulea caerulea (Linnaeus)

Visitant (mostly immature white birds), rare in spring and uncommon in summer and early fall, with more records for coastal than inland counties, and most birds occurring in southwestern Maine. One record of a bird lingering from May into September.

Spring. All records are: white male shot on April 1, 1902, at Vinalhaven, Knox County (Norton, 1902); adult seen on April 9, 1947, at Ocean Park, Old Orchard Beach, York County, by Mrs. G. Webb (*in* Gross, 1947f: 29); in 1928 an adult male was found dead on April 17 at Machias, and an adult seen on May 15 at Roque Bluffs, both in Washington County (F. Kilburn); a white female shot on May 19, 1901, at Phippsburg, Sagadahoc County (Spinney *in* Swain, 1901d: 29); an adult seen on May 19 and 20, 1936, at Stillwater, Penobscot County (Palmer); and a white bird which came to the Scarborough marshes in the latter part of May, 1881, and remained until it was shot in September (Wade, 1881a; N. C. Brown, 1882d; Smith, 1882–33: 104).

Summer and fall. Aside from the summering bird just mentioned, the only June record is for a single bird seen by B. Barker on June

17, 1948, at Verona, Hancock County, recorded by Gross (1948b: 71). For July, there are records at hand from the first of the month on, but mainly for the last week. I have 28 August records for at least 41 individuals in the years 1906, 1913, 1924, 1929, 1930, 1936, 1937, 1938, 1944, 1946, and 1947. Almost all occurrences were in coastal counties, notable exceptions being a white bird seen on August 20, 1946, at Jackman, Somerset County (Mrs. W. Foerster) and another shot on August 25, 1936, at Millinocket Lake, Penobscot County (Mendall, 1937a).

The largest flight occurred in 1948, mainly in August but with some birds lingering into September, and with most birds noted in the two southwestern counties. Probably about two dozen birds were present. Some data on the flight were given by Gross (1948a).

In addition to the few September occurrences in 1948, there are these earlier ones for that month: one seen on September 1, 1929, at Machias (F. Kilburn); five seen on September 1, 1936, at Lake Cobbosseecontee in inland Kennebec County (Mrs. C. E. Norton); and one seen from September 10 to 30, 1934, on Mt. Desert Island (A. Stupka).

Ecology. This is a bird of ponds, lake margins, marshes, and shallow water in slow streams, occurring to date somewhat more often on fresh than salt water. It is gregarious and also social, being seen in company with the American Egret and other herons.

Remarks. All records for adults have been cited above. The largest number of immature birds seen together was six, which I observed at Brunswick from August 7 to 10, 1929.

With only the 1881 record for the previous century, and most birds having been seen since 1928, a marked increase is very apparent. Solitary birds and pairs appear at several places in some years, then quite often some of these join company. This moving about and joining has caused a duplication of records for a given individual, which I have tried to eliminate, but the presence of some individuals certainly has not been noted at all.

This bird has occurred twice on offshore Monhegan (W. Taylor), but I lack dates for these visits.

Eastern Green Heron

Butorides virescens virescens (Linnaeus)

Summer resident, uncommon, chiefly along the coast (to about 35 miles inland) east to Penobscot Bay and up the Penobscot to Bangor and Brewer, and has occurred as a rare *visitant* eastward to Calais and

northward to the Sourdnahunk region in Piscataquis County, Jackman in Somerset, and Bethel and Upton in Oxford.

Spring. The average arrival date is about April 26, and records indicate that migration continues to about May 19. Early dates are for single birds and are: shot on April 18, 1929, at Brunswick, Cumberland County (Palmer); seen on April 21, 1933, at Brewer (Weston); and seen on April 25, 1910, at Farmington, Franklin County (Swain *in* Sweet, 1911a: 50). A spring record of interest is for a bird seen by Smith on May 17, 1875, at Machias, Washington County.

Fall. Most migrants are seen the last three weeks in September. An earlier record is for one seen September 8 and 11, 1944, at Brewer (Weston). For Pittsfield, Somerset County, W. Cooke (1913: 58) gave September 21 as the average date of last bird seen for three years. Farther north in the same county, a late date is September 22, 1937, when A. R. Phillips saw a bird at Moose River, near Jackman. Latest dates are for one seen October 2, 1898, at Pittsfield (*in* W. Cooke, ibid.), one seen October 3, 1915, at Somesville, Mt. Desert Island (Tyson and Bond, 1941: 53), and one seen October 5 and 6, 1915, at Falmouth, Cumberland County (Norton).

Breeding. As a rule this species nests singly, though several pairs may sometimes be found near each other. Placed in a small tree near water, the nest is a crude platform of sticks through which the eggs (probably four or five) can be seen. Laying in Maine probably occurs from May 20 to June 20, but actual dates are lacking. "C. D. Farrar has an egg that was taken from a nest in a fir tree beside Sabattus River at Lisbon [Androscoggin County] in 1872, and in 1873 another nest with young was found near the same place" (E. Johnson, 1900b: 32).

In studying a second nesting in Michigan, Cooley (1942: 9) found that incubation required about 20 days, and that both adults fed the nestlings which remained in the nest 15 to 16 days. On June 17, 1923, Norton found a nest in a gray birch at Westbrook, Cumberland County and three partly grown young were climbing about the branches. The young are fed by regurgitation. Fledging probably takes about 35 days, although the young climb when much younger. Perhaps only a single brood is raised yearly in Maine.

Ecology. This is a bird of sheltered waters having shallow and muddy margins. Although it may feed at any time of the day, it is most active in early morning and late afternoon. It is not gregarious, feeding territories being defended against intrusion by members of the same species.

Remarks. The Green Heron probably breeds every year in York, Cumberland, Sagadahoc, Androscoggin, and Kennebec Counties, and perhaps occasionally in at least Lincoln, Knox, Somerset, Piscataquis,

and Penobscot. The most likely places to see this bird are along the tidal creeks and in the marshes at Kittery, York County.

Farthest inland occurrences are: for Piscataquis County, a specimen from Dover-Foxcroft in 1926, and an undated specimen from the Sourdnahunk region (Ritchie, 1927: 14); for Somerset County, records for the vicinity of Jackman in the summer of 1937 (A. R. Phillips) and one seen there on July 7, 1940 (M. R. Lindauer), and one seen near Rockwood the last week of May, 1942 (A. S. Morrison); and for Oxford County, an adult on July 5, 1909, at Upton, and an immature bird in August or September, about 1907, at Bethel (Brewster, 1924: 203–204). There are no Aroostook County records. Although Mendall has done extensive field work in Washington County, he has not found this species there.

Williamson's (1832: 128) mention of the "Skouk" was the first Maine record of this species.

Boardman's first report (1862: 128) of "Summer visitant. Common. Breeds" for the Calais region, was later (1903: 309) altered to "Rare."

Black-crowned Night Heron

Nycticorax nycticorax hoactli (Gmelin)

Summer resident, common to numerous chiefly on inshore islands and adjacent mainland east to Jonesport, Washington County, with very few colonies any distance inland; *transient* in spring and fall, common coastwise and uncommon inland.

Spring. The average arrival date at Portland is April 17 (Norton), and migrants are noted in the state to May 12 or later. The species arrives April 22 to 26 at Fort Fairfield, Aroostook County (Chamberlain). Early dates are: one heard at night on March 31, 1918, at Falmouth, Cumberland County (Rich); seen on April 7, 1921, at Brunswick, Cumberland County (Walch, 1926: 16); April 7, 1944, at Brewer (Weston); and April 8, 1922, at Brunswick (Walch, ibid.).

Fall. There is a post-breeding dispersal movement noticeable in Maine by mid-August or earlier, when banded young from at least as far as Massachusetts have been taken. In early fall this species is most evenly distributed in the state. Some birds linger rather late at heronries. Most heronries "are often deserted by the first of October, but in the Fall of 1920 the birds did not leave the Whaleboat Island [Casco Bay] colony until November 12, and a pair of the birds remained until December 15, which is, as far as I know, the latest record of these birds in Maine" (Gross, 1923: 8). The birds usually leave the Portland region by October 20 (Norton). Other late dates are: one

seen, November 12, 1927, in Back Cove, Portland (Norton); and an immature bird seen, December 23, 1942, at South Portland (A. Williams).

Breeding. Several pairs often nest in the same tree. Typically the nest is a crude platform of sticks, rather sparsely lined with grass or other fine material, and built by both sexes in two to five days. Sometimes it is built on an old nest of the previous year, or of material from old nests. Immediately after the nest is completed, eggs, usually three or four, are laid at about two-day intervals. Full clutches of four eggs have been noted on May 12, 1907, at Falmouth, and May 15, 1914, at Scarborough (Norton), and Knight (1908b: 135) reported young "a few days old" as early as May 26, 1897, on Barred Island, Stonington, Hancock County. Probably most clutches are completed by May 24. Incubation, by both sexes, begins with the first egg and lasts 24 to 26 days. The young are fed by regurgitation, and fly at about six weeks. One brood is raised yearly. (Summarized from Gross, 1923, with additions.)

Ecology. A colonial breeder, this crepuscular and nocturnal species feeds in marshes and in shallow water in a wide variety of island, coastal, and inland localities. On moonlit nights when the tide is low, the birds often fly out over mudflats to the water's edge to feed. Norton (1923a: 20) stated that those nesting on Metinic Isle, Knox County, "were by no means strictly nocturnal in their feeding, but gave attention to the tides, going in pairs, fives and sevens, day or night, going ashore on the ebb and returning to the island with the flood tide. At least four miles of this space is over the unbroken sea." He also stated (ibid.) that the birds formerly nesting on offshore No Mans Land, in the Matinicus group in Knox County waters, had to go an even longer distance for food.

In Maine this heron usually nests in coniferous trees, placing the nest down from the top, where it is well concealed and shaded. Heronries may become large (to about 125 nests of this species), but, for reasons already given under the Great Blue Heron, their locations quite often are changed.

Like the Great Blue Heron, this species often is seen perching on weirs along the Maine coast, but the birds do not feed at such places. Aside from its colonial nesting, the species is not markedly gregarious, though a few sometimes may be seen flying together.

Remarks. The rate of decrease of this bird has slowed down since 1900. Probably not over 12 colonies of any size have existed in any one year in the last three decades.

Gross (1923: 18–21) has summarized data on food habits of this bird over much of its range. A wide variety of animal, and some

vegetable, food is eaten. In August, 1934, a young bird of this species, shot on Smuttynose Island in the Isles of Shoals, was found to have eaten three newly hatched Herring Gulls (P. L. Wright, 1937a: 10).

Yellow-crowned Night Heron

Nyctanassa violacea violacea (Linnaeus)

Six records. Two specimens, now in the Portland Society of Natural History are: an adult female taken April 13, 1901, at Back Cove, Portland (Swain, 1901d: 29; Brock, 1902); and a female taken April 11, 1906, at Thompson's Point, near Portland (Norton, 1906d). The date of capture for the latter specimen was given erroneously by Brownson (1906e: 85). According to E. A. Monroe (Forbush, 1925: 343), a bird was seen on August 13, 26, and 27, 1916, on Monhegan. Along the Medomak River in eastern Lincoln County, an adult was seen on July 25, 1937 (Cruickshank, 1938: 550), and another bird on July 26, 1939 (Cruickshank). An immature bird was seen during August, 1948, at Ocean Park, Old Orchard Beach, York County (Webb *in* Gross, 1948b: 72).

American Bittern

Botaurus lentiginosus (Montagu)

Summer resident, uncommon to fairly common throughout, maybe including a few inshore islands but no records except for Mt. Desert Island; *transient,* uncommon to sometimes fairly common throughout in spring and fall.

Spring. The Bittern usually is present throughout the state by April 20, and migration lasts until about May 16. It arrives April 11 to 18 at Brunswick, Cumberland County (Walch, 1926: 16). An early inland date is April 17, 1905, at Avon, Franklin County (Sweet, 1906b: 35). April 14 is the earliest date for Presque Isle where this bird usually arrives from April 18 to 22 (Chamberlain).

Fall. Migration begins by September 24, reaches its peak in early October, and very few birds remain after October 23. Brewster (1924: 190) gave October 23 of unstated year as the latest date for the Lake Umbagog region, and on the same date in 1876, Smith shot a bird at Machias, Washington County. Other late records are for a bird seen on October 28, 1904, at Westbrook, Cumberland County, and a specimen, in Norton's collection, taken on an unstated date in December, 1887, in Cumberland County. The latest definite date, and

an interesting record, is for a bird seen "the week of December 10," 1939, on Monhegan (Mrs. J. A. Townsend).

Breeding. Depending on available material, the ground nest is composed of cattail stalks, reeds, sticks, or other vegetation. Three to six (usually five or six) eggs are laid. Norton saw a pair, one bird displaying, on the early date of April 17, 1910, on Cape Elizabeth. H. Johnson (1919: 179) reported finding four fresh eggs on May 28, 1893, at Pittsfield, Somerset County. For the Umbagog region, Brewster (1924: 191–192) gave the following egg data: clutches of six, five, and three, all "quite fresh," on June 3, 1871; a clutch of five, two eggs with embryos "just beginning to form" and three without a trace on June 3, 1876; and two "quite fresh" malformed eggs on June 5, 1876. Knight (1908b: 127) reported four eggs on June 6, 1893, for unstated locality. Much earlier eggs are indicated by the following note from Mendall: "On June 4, 1946, at Snake Pond, South Brooksville, Hancock County, I found a nest containing four young approximately two weeks old. There was a little variation in the size of the young, but not much."

Near Montreal, Mousley (1939b) found that incubation apparently began with the laying of the first egg and, requiring 24 days, was probably by the female only, and that young left the nest in about two weeks, which was before they were fledged. Young are fed by regurgitation. The fledging period apparently is unrecorded. One brood is raised yearly.

Ecology. This crepuscular bird usually is solitary except in the breeding season. According to H. Johnson (1919: 179), it bends grasses down in swales to form a raised perch on which to spend the night. It is found in marshes, swamps, swales, moist grassy meadows, and in thickets of alders and other bushes characteristic of damp places. The nest is built in these localities, often among cattails, but almost as often in thickets and moist meadows. Brewster (1924: 190–192) reported finding three nests on a small floating island at the southern end of Lake Umbagog. Several times I have flushed fall transient birds from very small alder thickets along upland rills.

Remarks. Most authorities believe that the female bird does all the nest-building, incubating, and feeding of the young. Brewster (ibid. 190) suggested polygamy in one instance where he found only one male with three nesting females.

Samuels (1867: 405–406) stated that Bitterns bred in communities at the Richardson [now called Rangeley] Lakes in Franklin County. He may have seen young night herons, as he said the birds alighted in trees—a habit which Bitterns resort to but rarely—or perhaps, as at Umbagog, several may have nested quite near each other because suitable cover was not extensive.

A molting male, shot at Scarborough on September 1, 1894, had eaten grasshoppers (Norton). "In the stomach of the Common Bittern, besides frogs, I have seen the field mouse (*Microtus pennsylvanicus*) and the large Water Beetle (*Distycus*) [*Dytiscus*]" (Norton, 1909f: 439). Other writers have mentioned frogs in this bird's diet in Maine. Their main food from pond holes in salt marshes is probably killifishes (*Fundulus*).

The booming voice of the Bittern, sounding like someone driving a stake into mud, is heard occasionally until well into June. The reader is referred to Hardy's observations (1889) on it. Swain (1901a: 26), who found flightless young in July, 1889, near his home at Farmington, Franklin County, and kept them captive, stated that one of these gave the stake-driving vocal performance that same autumn.

For interesting data on breeding at Scarborough and Machias, the reader is referred to Smith (1882–83: 104–105).

Eastern Least Bittern

Ixobrychus exilis exilis (Gmelin)

Visitant, rare in York, Cumberland, Androscoggin, Sagadahoc, Lincoln, Knox, and Washington Counties, probably breeding in York and Cumberland.

Spring. This species probably arrives in late April. One was taken on March 14, 1891, at Popham Beach, in Phippsburg, Sagadahoc County (C. F. Haley). There is a doubtful report of occurrence on May 12, 1905, at Biddeford, York County (*in* Brownson, 1906d: 66).

Fall. This bittern probably departs in late September or early October. One was taken "early in September," 1881, at Popham Beach (Smith, 1882–83: 105), and one was shot on September 6, 1902, at Great Pond, Cape Elizabeth (Rogers). The latter specimen was one of five, actually six, taken about Portland at nearly the same time and mentioned without dates by Swain (1902c). The latest record is for a bird taken on November 13, 1907, at Lubec, Washington County, recorded by Clark (1907b).

Ecology. These birds are inconspicuous inhabitants of cattail marshes and sedgy margins of ponds and streams. "They are very gentle, are diurnal and not nocturnal, nest upon the ground, do not associate in colonies, and I have never seen one alight upon a tree, although not infrequently I have observed them upon the large stalks of marsh hay, where they were industriously seeking and devouring insects" (Smith, 1882–83: 105).

Remarks. "It has been found to breed in all the New-England States" (Samuels, 1867: 404). "In 1863 several pairs were breeding

at Scarboro, as also others at Falmouth [both in Cumberland County], but within the last dozen years I have not seen a single specimen in the same localities. . . I once watched a family of seven during July and August" (Smith, loc. cit.). Norton had a number of recent records for birds seen in the same region. It was listed as a rare summer resident in Androscoggin County on authority of E. E. Johnson (*in* Knight, 1897d: 39; 1908b: 128).

If this bittern still breeds in the state, the place to look for nests would be in the marshes of York and Cumberland Counties. As elsewhere in the breeding range, nest sites undoubtedly would be in bunches of cattails, the nest being made of dry pieces of these. Probably four to seven eggs are laid in June. Outside the state, different authors give 15 to 17 days for incubation which is by both sexes. The fledging period is not known.

The first Lincoln County record was for July 21, 1948, when Cruickshank saw a bird of this species at Medomak in Bremen.

Audubon (1835: 417) first listed this bird as occurring in Maine.

Family CICONIIDAE

Wood Ibis

Mycteria americana Linnaeus

Two summer records. One was shot on July 16, 1896, at Berwick, York County, and was in the collection of Professor J. Y. Stanton of Lewiston (Powers, 1897h; Knight, 1897d: 38). This collection is now at Bates College in Lewiston. Gross (1922) wrote: "We have just received a Wood Ibis taken at Cundy's Harbor, Maine—the second record for this State." This locality is in Harpswell, Cumberland County, and the date, when the bird was found dead after a storm, was August 10, 1922. The specimen is in the collection of Bowdoin College in Brunswick.

Family THRESKIORNITHIDAE

Eastern Glossy Ibis

Plegadis falcinellus falcinellus (Linnaeus)

Three spring records. One was present for about three weeks in May, 1931, at Toddy Pond in East Orland, Hancock County; it was very tame and a good photograph of it was published in the *Bangor Daily News* on May 21, 1931 (Norton *in* Gross, 1937a). Two birds were

seen first on April 22, 1935, at Lubec, Washington County, by Radcliffe Pike; after a week one of them vanished and the other was seen frequently until May 6 when it was found dead, having been wantonly shot; it is now in the Bowdoin College collection (Gross, ibid.). One was found dead, April 30, 1937, at Springfield, Penobscot County; it was in the possession of the late Walter Clayton for a while, then secured by Norton for the Portland Society of Natural History.

Family PHOENICOPTERIDAE

American Flamingo

Phoenicopterus ruber Linnaeus

Hypothetical. About 1871, the father of Everett Sinnett shot a Flamingo at Baileys Island, Harpswell, Cumberland County; the son was about eight years old at the time and remembered the bird as having a long goose-like neck and being reddish in color. Ten years later, or about 1881, another was seen there in April or May. These data were obtained by Norton from Sinnett on August 11, 1931.

Family ANATIDAE

Mute Swan

Cygnus olor (Gmelin)

One record, probably a feral bird, aside from captives of this Old World species which have been kept in parks for ornamental purposes. A bird, not pinioned and showing no signs of captivity, was found weak and famished on November 29, 1937, at Falmouth, Cumberland County. Norton examined it and, after it died in captivity, obtained the specimen for the Portland Society of Natural History.

Remarks. A swan of this species, seen for several days in the spring of 1918 on the Spurwink marshes in Scarborough, undoubtedly was an escaped bird, as was also the one seen with tame ducks on September 30, 1917, at Great Diamond Island in Casco Bay (Norton).

Whooper Swan

Cygnus cygnus (Linnaeus)

One record. A specimen was taken on September 10, 1903, at Mud Lake in the town of Alexander, Washington County. It was reported first by Swain (1904a: 1), who wrote that the taxidermist who mounted

it did "not think it a captive bird as it bore no marks of captivity . . . Its measurements were, length, 3 feet and 11.75 inches; wing, 17.75 inches; extent, 5 feet, and 9 inches." Clarence Clark (1905a: 23), who identified the bird as *Cygnus cygnus*, wrote that he had purchased it for his collection housed at Lubec, Washington County. He stated that he had carefully secured all the facts concerning its capture, and added: "It is easily distinguished by the yellow covering of the lores, and extending over the larger portion of the upper mandible, while its near relative *columbianus* has the yellow only on the lores, and *buccinator* having no yellow." Norton saw the specimen and concurred as to its specific identity.

Remarks. A photograph of the mounted specimen was the frontispiece of the March, 1906, issue (vol. 8, no. 1) of the *Journal of the Maine Ornithological Society.* This picture subsequently was reprinted by Knight (1908b: opp. 124). Clark (1907a: 79) reported that he had sold the specimen to the John Lewis Childs Museum at Floral Park, New York. Much of the Childs collection later was discarded or destroyed, after having been in the Brooklyn Museum for a period. Perhaps this specimen is in existence yet in one of the display cases, which are covered with boards and in storage at this museum, but now (1948) are the property of the Children's Museum of Brooklyn.

Knight (1910a) was misinformed that this specimen was in the Bowdoin College collection.

If the proposed small Icelandic race of this species should be recognized, it would seem, from the wing measurement given above, that the Maine specimen belongs in that category. This species was exterminated as a breeding bird in southern Greenland (Bent, 1925: 278).

Whistling Swan

Cygnus columbianus (Ord)

Transient, rather rare in spring and fall.

Spring. All records are: an adult, shot on March 29, 1908, at Webb Pond in Waltham and Eastbrook, Hancock County (Knight, 1910a), is now in the Portland Society of Natural History; five "white swans," mentioned in a dispatch in the April 2, 1918, *Portland Evening Express*, as "recently" having been seen flying over Belfast, Waldo County; one seen on April 5, 1926, over Merrymeeting Bay, with a flock of Canada Geese which it deserted to fly down the Kennebec River, and reported by several persons (Norton); two seen on April 28, 1939, at Merrymeeting Bay (Earl Brown); eight seen on April 30, 1932, near Lewiston, Androscoggin County (May, 1932b: 270); and in late April of 1928,

two were seen by many persons, about Pleasant Point, Merrymeeting Bay, where they remained for more than a week.

Fall. All records are: on September 29, 1929, according to reports of federal warden Bertrand E. Smith, two swans were at Merrymeeting Bay, and two at Moosehead Lake; six seen over Lake Auburn, Androscoggin County, in early October, 1920 (S. Waterman); at Lower Kezar Lake in Fryeburg, Oxford County, three were seen on October 27, 1917, eighteen appeared the next day, an adult male and a young female being secured from this flock for the State Museum at Augusta, and at Lake Auburn, a flock of 49 birds was seen on the last day of the month (C. E. Miller, 1918: 68); an immature bird shot near Brick Island, Merrymeeting Bay, in November, 1881 (Smith, 1882–83: 124–125); one shot, in late November, 1919, at Swans Island, Hancock County, by a gunner who supposedly mistook it for a white goose and, on finding that it was a swan, left it in the water where it had fallen (Norton); one, reported by several observers, at and near Merrymeeting Bay for two or three days in late November, 1944, and seen by Cottam (1945) on the 28th; and in the fall of 1929, one caught alive near Crumple Island, south of Jonesport, Washington, and kept in captivity, but what became of it is not known (Norton).

Remarks. Swans were mentioned by Rosier (1605; 1887: 159) as having been seen in Knox County or adjacent waters in May or June, 1605. Josselyn (1674; 1865b: 79) stated that "*Hookers* or wild-*Swans*" occurred at Scarborough during his stay there, which was from 1638 to 1639 and 1663 to 1671. In editing the journals of Paul Coffin, J. Howard wrote (Coffin, 1856: 275) that in "Lovwell's Pond and the waters in that vicinity, swans were found by the early settlers of Fryeburg [Oxford County] and the adjacent towns." W. Goold (1886: 116) wrote: "Up to the beginning of this [19th] century, wild swans were among the waterfowl frequenting the small ponds of Cumberland County. At the time mentioned Richard Knight, of the present town of Falmouth, shot a white swan; one of a pair which came to the Duck pond [now Highland Lake] in Westbrook every season. None have been seen there since. About the same time William McGill, of Standish, killed one of the same species while flying from one pond to another." Although none of these early writers gave the species, it is hardly to be doubted that they referred to Whistling Swans.

The November, 1881, record for Brick Island, cited above, was considered hypothetical by Knight (1897d: 137; 1908b: 648–649), but the specimen was seen and checked by Spinney for Norton, so the record is a valid one. The specimen, in the collection of Charles Greenleaf of Bath, subsequently was destroyed by fire.

The word "Swan" is part of the place name of one or more islands,

hills, towns, ponds, lakes, and brooks in Maine. The evidence that any one of these was so named because of the former occurrence of swans is tenuous. In the case of the islands, one source of origin may be a corruption of the word *sowangan* (variably spelled), which is an Abnaki word meaning eagle, and may have been used by the Indians to indicate favorite nesting places of the Bald Eagle. In some other cases, the origin may be traced to romantic sources. For example, Swan Lake, in Waldo County, is a prettier name than its former one of Goose Pond.

Trumpeter Swan

Cygnus buccinator Richardson

Hypothetical. "Some years ago (prior to 1868) a swan was seen at Scarboro, Maine during several consecutive days. The late Caleb G. Loring, Jr., to whom the common swan (*C. americanus* Aud.) was well known, observed this bird repeatedly fly from the [Saco] bay and circle about over the marsh high in the air, uttering cries which led Mr. Loring to believe the bird to be a trumpeter swan" (Smith, 1882–83: 224).

C. W. Beebe (*in* Coale, 1915: 87), recording specimens having been in the New York Zoölogical Park, wrote that one was "from Lewiston, Maine (Nov. 25, 1901, found exhausted)." Norton, in an attempt to corroborate this record, wrote to Lee S. Crandall at the Park. Mr. Crandall's reply, October 27, 1921, stated that the Park's files recorded the specimen as purchased and received, but, "Whether or not it was actually caught in Maine, I cannot say, as it was secured with a number of other birds, probably from a dealer." Eleven other states, including some western ones, have Lewiston as a place name.

Eastern Canada Goose

Branta canadensis canadensis (Linnaeus)

Transient, more abundant in spring than in fall; *summer resident,* rare breeder (wild, also feral birds), and uncommon non-breeder (? all feral birds); *winter resident,* uncommon on salt water.

Spring. Although small flocks have been seen flying along the coast in the latter part of January, these probably were wintering birds. Migration begins by February 20, the birds concentrating on salt water. In the latter part of the month, and to early April when the ice goes out, flocks fly to Merrymeeting Bay, remain on the ice a while, then return to salt water. After the ice leaves the bay, thousands of

these birds may be found here, with a peak population usually present April 11 to 16. By mid-April, many have departed, but large numbers remain for another eight or ten days, and small flocks have lingered as late as May 16 and, once or twice, into June. Some of the later migrating flocks stop briefly on inland lakes, for the ice generally is out by early May.

Fall. Fewer birds pass at this season and the flight is mainly near the coast; perhaps also, some pass by at sea from Nova Scotia to Cape Cod. Most transients are seen October 10 to November 20, but migration sometimes continues well into December. On December 15, 1917, several very large flocks flew over Portland (Norton).

Flight years. Of the incomplete data at hand, the following seem worth recording: *1894*, "very plentiful" in spring in Casco Bay (Willard, 1895: 184); *1906*, unusually numerous in spring in Casco Bay and eastward (Norton); *1909*, very plentiful in fall in Cumberland County (Rogers); *1911*, the third week of March, very large numbers present in Casco Bay (Pillsbury) and about Damariscotta, Lincoln County (F. M. David); *1920*, unusually abundant in spring at Merrymeeting Bay (Spinney); and in *1941*, more than usual present there in fall (various observers). The flight was very small throughout Maine in the spring of 1908.

Breeding and summer. The ground nest, not far from water and sheltered by shrubbery, is a depression with leaves, grasses, and similar material added, and a lining of down. Probably five or six eggs make a clutch. In Illinois, Kossack (1947: 125) found that the incubation period usually is 26 days, but may vary from 25 to 27. The gander stays nearby during incubation, and both parents tend the young, which are fledged in not less than six weeks. One brood is raised yearly.

Maine data are scant, but of the following two records, the latter indicates later nesting than is reported for similar latitudes elsewhere. In recording the data, Mendall (1945b) stated that they referred to "strictly wild" birds. The earliest of these was in 1939 when a pair nested near Old Town, Penobscot County, and the goose was shot by a poacher. She had laid five eggs. From a plane flying low over Chemquassibamticook Lake in northwestern Piscataquis County, George J. Stobie and William Turgeon saw two broods, each accompanied by both parents, in early July, 1944. The men landed and, from a boat, observed one of the broods (four downy young) at a distance of 50 feet.

In 1948 I was told on reliable authority that, for several years prior to about 1944, at least one pair nested successfully at Shallow Lake in Townships 13 and 14, Range 7, Piscataquis County. Illegal shooting of adults and fledged young one year in August ended nesting at this place.

There are fewer records of Canada Geese for June than for any other month. This is due perhaps to the relative scarcity of the non-breeding birds and to the secretiveness of any breeding ones. The few small flocks occasionally reported in June probably are escaped or semi-captive birds and, perhaps, young non-breeding ones. Undoubtedly some of the single birds seen are sick or injured individuals. Some years several flocks have been seen in August, generally on or near salt water but sometimes well inland. A small flock spent most of the summer of 1941 near Presque Isle (Chamberlain).

Winter. Stephens (1934: 156–157), reminiscing about Norway, Oxford County, told of a flock of geese which became frozen in a pond there in November, 1843, and of these, 19 were killed with a pole. From about December 5 to February 20, small flocks are seen on salt water. These usually contain less than a dozen birds, occasionally 20 or 25, and one flock of about 50 was seen by J. R. Wallace on January 31, 1932, in Casco Bay. Inland, but not far from tidewater, two were killed the first week in January, 1884, at Holden, Penobscot County (Hardy).

Ecology. This bird, found on salt, brackish, and fresh waters, including rivers, ponds and lakes, feeds about the shores and on bottom vegetation in shallow water. It sometimes feeds on grass on uplands, but does so far less commonly in Maine than elsewhere. In winter, flocks occur on salt mud flats, where some vegetation can be obtained at low tide. If the species increases as a breeding bird in the state, the nesting habitat probably will be a rather wide variety of situations close to fresh water, including islands in lakes and ponds. This bird is highly gregarious in migrations, in winter, and reported slightly so in the breeding season.

Remarks. This goose nested in Maine in colonial times, then apparently was absent as a strictly wild bird for a long period. Rosier (1605; 1887: 126), who was with Waymouth among the Georges Islands, Knox County, in part of May and June in 1605, stated that Indians brought four goslings for barter. Undoubtedly these were Canada Geese. Ridlon (1895: 438) wrote that this species occasionally nested about ponds in York County in early times, when their eggs were taken and hatched under domesticated geese. Cyrus Eaton (1851: 164) told of a pair of wild geese that, in 1776 and for many years thereafter nested on an island in Seven-tree Pond in Warren, Knox County, and which were finally "driven from their old domain by the vandal hand of sport." Coffin (1856: 345), in his journal of a missionary tour in Maine in 1797, wrote of Moosehead Lake as "a place in which wild geese are supposed to hatch their young in great numbers." About as indefinite as Coffin, Audubon (1835: 1) wrote that geese were said to nest in the interior of Maine and Massachusetts.

In 1915 a pair nested at Freeport, Cumberland County, and in 1921 a pair at Merrymeeting Bay, near the old Bay Bridge (Norton). In 1927 a pair raised five young at a small pond in Westport, Lincoln County, later moving to Sheepscot Bay where all were shot on the opening day of the hunting season (Spinney). A pair nested at Merrymeeting Bay in 1930, and two pairs in 1932 when I saw them with young, two-thirds grown, on July 29. Perhaps all these records are for feral birds, as were the reports investigated by Mendall (1945b), who wrote: "In the lower Kennebec River valley of south-central Maine, and in the coastal portion of Washington County in the extreme eastern part of the state, there have been frequent reports during the last decade of nests or broods of this species. All reports that were investigated, however, have been found to pertain to the nesting of released or escaped semi-domesticated birds. A number of releases of pen-reared geese have been made in the vicinity of Lubec, in Washington County, by a sportsman who for several years maintained a small waterfowl sanctuary. Moreover, from time to time, wing-clipped birds escaped from the sanctuary and occasionally nested in the general vicinity. Similar dispersals have occurred in southern and central Maine from pen-reared stock."

With the beginning of spring protection in 1916, geese have lingered much later in the state at this season. They build up fairly large populations for a while in favored places, especially in Cumberland, Sagadahoc, and Lincoln Counties. Occasionally very large numbers are reported at Merrymeeting Bay, but 12,000 to 14,000 is above the usual peak of the spring population, and I doubt that over 20,000 ever have been present at any one time.

Norton (1909f: 439) reported rhizomes of eelgrass (*Zostera*) and sea lettuce (*Ulva lactuca*) from digestive tracts of Canada Geese. On December 8, 1932, he saw a goose pulling up roots of salt marsh-grass (*Spartina alterniflora*) at Back Cove, Portland.

The heaviest bird of which I have record was a spring gander weighing over 13 pounds. On April 16, 1910, Norton weighed nine geese shot at Cape Elizabeth, and found weights as follows (only three were sexed): three females, 5¼, 6½, and 6¾ pounds; unsexed birds, 6¾, 7½, 7¾, 8¼, 8½, and 9 pounds. The average was about seven pounds six ounces. Number of tail feathers ranged from 16 to 18. (See comments on small Canada Geese under Richardson's Canada Goose.)

Partial albinism has been noted several times among geese at Merrymeeting Bay. Here, on April 21, 1932, I saw three having white bodies and chin-patches and blackish heads and necks.

Two Canada Geese yield a pound of feathers which, about 50 years ago, sold for 25 cents. In the 1870's, geese sold for a dollar each in the markets of Portland and elsewhere.

Goose bones (species not stated) have been reported from at least one shell-heap by Moorehead (1922: 166). Josselyn (1674; 1865b: 80) wrote: "of the skins of the necks of grey *Geese* with their Bills the *Indians* makes Mantles and Coverlets sowing them together and they shew prettily."

That "geese" were abundant in "winter" on Monhegan (H. L. Shaw, 1903) is an error.

Richardson's Canada Goose

Branta canadensis hutchinsii (Richardson)

One record and several very questionable reports of occurrence. On April 20, 1947, one was captured alive at Swan Island, in the Kennebec River east of Bowdoinham, Sagadahoc County. It was kept for about a week before being released at Mere Point in Brunswick, Cumberland County. A photograph and measurements of the bird have been published by Gross (1947j).

Remarks. Audubon (1835: 17) wrote: "It is alleged in the State of Maine that a distinct species of Canada Goose resides there, which is said to be much smaller than the one [Eastern Canada Goose] now under your notice, and is described as resembling it in all other particulars." Locally, he wrote, it was called the "Flight Goose," and occurred only in migrations. Further on (ibid. 526), under "Hutchins's Goose," he called it the "Winter or Flight Goose" of Maine gunners, and repeated that it resembled the "large and common kind in almost every particular except its size." He saw no specimens.

Audubon's writings were well known to Everett Smith, who reported (Smith, 1882–83: 125) that he had shot the present "variety" in Maine. Webster (1892b: 174) wrote: "While at Linc Daniels' [a Portland taxidermist], a specimen of Hutchins Goose that had been shot in Maine was brought in to be mounted." A specimen, reported by Brock (*in* Knight, 1897d: 37; 1908b: 123) as having been taken on November 13, 1894, at Great Pond, Cape Elizabeth, was supposed to be in the Brock collection at the Portland Society of Natural History. When I checked this collection, however, the nearest to *hutchinsii* that I found was a rather small individual of the subspecies *canadensis*. Brock also stated (ibid.): "I have seen a specimen said to have been shot in the Rangeley region." Three birds, alleged to have been of this race, were received in the spring of 1899, from the vicinity of Portland, by John Lord (Lord *in* Knight, 1908b: 123).

There is a sight record for April 12, 1906, in the Portland region (*in* Brownson, 1907c: 36). For the same season and locality, Walter Rich

(1907a: 270) stated. "This spring I have had four of these so called 'short necked geese' of which one was doubtful, and three undoubtedly of the present sub-species."

Fall flights of the Eastern Canada Goose generally contain a number of small individuals, called "Hutchins Goose" and/or "Lesser Canada Goose" by the gunners. McAtee (1945: 462), citing E. B. Sawyer, added the word "brant" as a name used at Jonesport, Washington County. Rogers, a gunner of much experience and who had shot what he termed "Hutchins Goose" in Cumberland County, told Norton that these birds weighed eight to ten pounds. Actually the weight is three to six pounds. Independently, both Norton and I have examined some of the small geese, shot in Cumberland County and at Merrymeeting Bay, and have found that they were, without a single exception, smaller specimens of the Eastern Canada Goose.

The existence of local names for small geese in Maine can hardly be construed as sufficient evidence of the occurrence of the race *hutchinsii*, and I find no concrete proof that this bird occurred in the northeast more frequently in the past, as suggested by Forbush (1925: 295), F. H. Allen (1940: 77), and McAtee (1945).

American Brant

Branta berniela hrota (Müller)

Transient, abundant in spring and fall, the main flight passing well offshore but others reaching our coast, especially in bad weather, and large numbers often lingering late in spring in Washington County coastal waters; *non-breeding summer resident*, rare on salt water. One inland record.

Spring. In bad weather some birds occur at inshore points all along the coast, but normally the flight is from Cape Cod across the Gulf of Maine to the Bay of Fundy and adjacent waters. First arrivals at coastal points in Maine are seen from March 7 to 20, usually nearer the latter date. Most birds depart by April 16, although many others, including late arrivals, linger regularly at favorite feeding places in Washington County waters (sometimes over 1,000 near Lubec) into the first week of May or even later. Dates later than May 10 for southwestern Maine are: three, May 16, 1918, near Richmond Island, off Cape Elizabeth, one, May 16, 1922, in Casco Bay, five, May 18, 1937, at Scarborough, one shot on May 21, 1914, at Peaks Island in Casco Bay, and 12 seen on May 24, 1939, at Scarborough (Norton); two very large flocks seen on May 26, 1784, as they flew over Portland (Smith and Deane, 1849: 356); and about 30 on May 31, 1946, at Scarborough (G. Webb).

Fall. In fall the Brant follow the reverse of the spring route, passing by chiefly offshore. In bad weather, flocks, sometimes containing an estimated 2,000 birds, have occasionally spent some days at the eelgrass beds in Casco Bay. Usually they appear after October 22, the earliest record being for nine birds seen by Smith on October 16, 1879, at Scarborough. Flocks occur throughout November, later records being for three (one shot) on December 9, 1926, at Scarborough (E. S. Monroe), a large flight shortly before December 14, 1929, at Petit Manan Point, Washington County (B. E. Smith), and several seen on December 15, 1893, at Popham Beach, Phippsburg, Sagadahoc County (Spinney).

Summer. All records are: one seen on June 9, 1930, in eastern Casco Bay (E. Sinnett); one seen on June 13, 1937, in Muscongus Bay (Cruickshank); one, quite unwary, seen on June 19, 1941, at Scarborough (Norton); one, apparently healthy, seen on June 21, 1938, near Vinalhaven, Knox County (R. Tousey); one seen to fly a quarter mile, July 12, 1931, in Muscongus Bay (Norton); two seen on July 20, 1895, at St. George, Knox County (Rackliff); three, apparently healthy, seen on July 30, 1945, at Cove Island, Addison, Washington County (Weston); and, in eastern Casco Bay, two seen all summer to August 9 or later, in 1931, and a small flock on August 9 (E. Sinnett), which, from the date, would hardly seem to refer to fall transients. This flock undoubtedly was the same seen by Rich on September 21 in the same area.

Ecology. This is a salt water bird, feeding on eelgrass (*Zostera marina*), sea lettuce (*Ulva lactuca*), and, according to Norton, on flotsam at sea. Eelgrass grows from about mean low tide to perhaps 12 feet lower, so that the birds may get it on the mud flats at low tide, or by 'up-ending' for it in shallow water. When not feeding, at high tide and at night, the flocks move farther from shore. The strong tides in the Bay of Fundy prevent growth of much eelgrass there, so that the inshore Brant are concentrated mainly in more sheltered Maine bays a short distance to the westward.

Remarks. The Brant population is subject to fluctuations, as shown by J. C. Phillips (1932), who tabulated data from Massachusetts gunning records. Eelgrass, the dietary mainstay of this bird, is subject to periods of scarcity which, in turn, seriously affect the population of the species. This grass is now recovering from an almost complete disappearance along the Atlantic coast, which occurred in 1931. I am not aware that the causative agent for its near disappearance is known definitely. There were many more Brant in 1931 than at present, although the population is increasing.

Some Maine gunners consider Brant difficult to approach by sculling, for the birds tend to avoid large floating objects.

Barnacle Goose

Branta leucopsis (Bechstein)

Hypothetical. Audubon (1835: 609) wrote: "Several old gunners on the coast of Massachusetts and Maine, who were Englishmen by birth assured me that they had killed Barnacles there, and that these birds brought a higher price in the markets than Common Brent Geese." T. M. Brewer (1875: 452) was confident that all New England records were of escaped captives. J. A. Allen (1878: 34) wrote: "I understand specimens have recently been taken near Portland, Maine." Later, Allen again (1886: 233) listed Maine as a place of capture, but this cannot be confirmed now.

Common White-fronted Goose

Anser albifrons albifrons (Scopoli)

One record. In early November, 1922, a goose flew against an automobile near Wiscassett, Lincoln County, and was killed. It was dressed and eaten, but the wings were secured by T. A. James, then curator of the State Museum at Augusta, who identified the bird. Forbush (1925: 291) gave Augusta as the place of capture, but the correct locality was stated by Norton (1926a: 91).

Remarks. There is an unconfirmed sight record for a flock of about a dozen, seen and heard by F. Johnson in April (before the 8th), 1913, flying over Great Pond, Cape Elizabeth (Norton).

Boardman's statement (*in* Baird, Brewer, and Ridgway, 1884, 1: 451) of "occasional occurrence near Calais," was later altered by him (*in* Knight, 1897d: 137) to indicate occurrence at Grand Manan; therefore the statement, "Boardman says it occurs in Maine" (Forbush 1912: 176), is incorrect.

Lesser Snow Goose

Chen hyperborea hyperborea (Pallas)

Fall transient, rather rare, occurring most often near or on the coast, singly or in pairs and less often in small flocks. All snow geese occurring in fall in the state are believed to be of this subspecies.

Fall. Although there are September sight records, most occurrences have been in October. Extreme dates for birds identified to subspecies are October 4 to December 11.

Ecology. This goose has been observed along the coast, feeding on shore and in waters where eelgrass grows. It also has occurred inland

on lakes, ponds, and in fields, feeding on both aquatic and terrestrial vegetation.

Records. The following are for identified specimens: one killed in December, 1880, near Portland (N. C. Brown, 1882c: 2); male shot on October 4, 1893, at Toddy Pond, Hancock County (Brewster, 1897); one shot at Pushaw Pond, Penobscot County, and another at Nicatous, Hancock County, both prior to 1897 (Hardy *in* Knight, 1897d: 36); one shot on October 10, 1897, and its companion a few days later, between Richmond and Merrymeeting Bay (Knight, 1898b: 14; 1908b: 120); one shot the week of November 16-21, 1908, at Gorham, Cumberland County (Norton, 1909a; corrected, 1913: 575); five shot on October 2, 1915, at Cape Elizabeth, by F. H. Darling (Norton, 1916: 381); three shot October 1, 1923, at Merrymeeting Bay (Walch, 1926: 15); a dead bird, picked up on December 11, 1929, near Turner, Androscoggin County, and seen by Norton in the Turner Natural History Society collection; a male shot on October 16, 1932, in Falmouth, Cumberland County, and in the Walter Rich collection (Norton); and an exhausted bird picked up in a field on December 6, 1940, at Poland, Androscoggin County (J. Stickney).

All other fall records for snow geese, not identified, are: one shot on October 18, 1881, at Glenburn, Penobscot County, and another on November 25, 1881, at Hallowell, Kennebec County (Smith, 1882–83: 125); one seen on October 9, 1911, at Cape Elizabeth, by Rogers (Norton, 1913: 575); a number seen on September 28, 1915, at Great Pond, Cape Elizabeth, and mentioned in the records of the Great Pond Club (Norton); one shot in September, 1916, at Merrymeeting Bay, weighing under four pounds (E. Brown); two shot on October 12, 1927, at Merrymeeting Bay, by Donald Percy of Boston and Vaughn Allen of Concord, one of the birds reported as weighing 7½ pounds (Norton); and a flock of perhaps 50 present in November and December, 1931, about Chebeague Island and Long Island in Casco Bay (various observers; newspaper reports).

Greater Snow Goose

Chen hyperborea atlantica Kennard

Spring transient, rather numerous at Merrymeeting Bay and uncommon elsewhere. All snow geese occurring in spring in the state are believed to be of this subspecies.

Spring. Extreme dates for identified birds are April 7 to 30. Extreme dates for sight records are March 29 to May 8.

Ecology. This bird, partial to shallow or estuarine waters where there is a soft or silt bottom, feeds chiefly on submerged roots or sprouts

of vegetation. As associates of Eastern Canada Geese which remain in numbers for a long period in spring, the snow geese linger with them on salt water and move into the shallow brackish water of Merrymeeting Bay when the ice goes out.

Records. The following are for identified specimens: a female shot on April 7, 1890, at Heron Island, Phippsburg, Sagadahoc County, and received in the flesh by Batchelder (1890); one shot on April 25, 1903, at Back River in Georgetown, Sagadahoc County, and in the Spinney collection (Spinney *in* Swain, 1904e: 69) at Augusta; one shot on April 22, 1904, at Georgetown and identified by Spinney (Norton); one shot on April 30, 1906, at Lubec, Washington County, and in the collection of Clarence H. Clark (Clark, 1906: 48); a flock of about 30 seen by Pillsbury and others at Scarborough on April 4, 1913, and the next day, from one of several smaller flocks reported in different parts of Casco Bay, four birds shot at Great Chebeague Island, the head of one being secured and identified by Norton (1913: 575–576); and a male, from the many birds present at Merrymeeting Bay in the spring of 1939, picked up sick and, after dying in captivity, sent to the Portland Society of Natural History (Norton).

All other records of snow geese in spring are: a flock of eight or nine, in the spring of 1800, at Matinicus Island, Knox County, and all shot (Williamson, 1832: 144); a flock, estimated at 200 birds, April 13, 1908, on the ice at Long Pond in Harrison and Bridgton, and the following day, on the ice at Sebago Lake, all in Cumberland County (Mead, 1908a); a flock of about 20 on April 4, 1913, at Pine Point, Scarborough, and the following day, from one of several small flocks in Casco Bay, four birds shot by I. W. Pillsbury (Norton); a flock of about 30 in April, 1925, in Casco Bay (J. R. Wallace); two small flocks totalling about 25 birds, in late March or early April, 1926, in Casco Bay (E. Sinnett); at Merrymeeting Bay, one on April 26, 1930 (D. V. Alexander), 11 on April 20, 1931 (Palmer), one on April 10, one on the 13th, 18 on the 19th, about the same number on the 20th, and one on May 8, in 1932 (W. C. Baker and Palmer), and two on March 29, 1937 (Gross); eight present for about a week and last seen on April 18, 1938, at Winn, Penobscot County (F. Dingley); small flocks, reported to Norton, in various sections of southwestern Maine from April 16 to 18, 1939, with a maximum of 100 birds at Merrymeeting Bay on the 16th, of which the last left on the 28th (except the sick male noted above); for the same year, Gross estimated small numbers present at the bay prior to April 13, with 400 to 500 on that date and all departed by the 15th, and H. C. Kennington saw 200 there on the 20th; 14 birds seen at the bay on April 6, 1940 (Gross); one with a Blue Goose seen for several days in April, 1942, about Orono, Penobscot County, and feed-

ing with gulls at a dump on the 21st (Mendall); and a flock, estimated to contain 1,000 birds, seen on April 7, 1944, near Seguin, and flocks of one to several hundred at other coastal points the same season, as reported to Gross.

Remarks. Of several records of snow geese, published without reference to season of occurrence, that of Josselyn (1674; 1865b: 79–80) is worthy of mention. He stated that three kinds of geese—the gray, the white, and the brant—occurred at Scarborough in his time, and the white geese were lean and tough and lived a long time, whence the proverb, "Older than a white *Goose*."

Inadvertently the scientific name for this subspecies was used by Norton (1909a) for a specimen of the smaller race, an error that he later (1913: 575) corrected.

Blue Goose

Chen caerulescens (Linnaeus)

Five records. C. E. Clarke (1916) saw and examined a mounted specimen in the possession of Walter Conley, of Isle au Haut, who had shot the bird on November 13, 1913, at nearby Little Spoon Island. One was taken on September 27, 1924, at Lubec, Washington County, and added to the collection of Clarence H. Clark of that town (Norton, 1925c). Near Brewer, one of these geese, accompanied by a Snow Goose, was seen for several days prior to April 16, 1942, when it was caught in a muskrat trap, and the skin was presented to the Bowdoin College collection (Gross, 1943). One was captured in a duck trap and banded, on April 15, 1948, at Little Swan Island, near Richmond, Sagadahoc County, and on the 25th, two were seen in the vicinity (Powell, 1948).

Remarks. Williamson (1832: 143) listed the "*bluish Goose*," under the name "*Anser Caerulescens*," as occurring in Maine. In commenting on this, Norton (1925c) wrote: "Since he was a devotee of fowling and says 'we have seen three species' there seems no reason to doubt that he had himself seen the bird."

On authority of Boardman, it was stated in Baird, Brewer, and Ridgway (1884, 1: 438) that this bird occurred "occasionally in the neighborhood of Calais," and that a specimen had been taken at Grand Manan. Undoubtedly this report was the basis for the statement by Elliott (1898: 43, 44) that the species had been taken on the coast of Maine. In his later list, however, Boardman (1903) omitted mention of this species altogether.

A young Blue Goose was taken on October 2, 1896, at "Lake Umbagog, Maine" (Brewster, 1897). Knight (1897d: 137; 1908b: 648)

reported the same specimen as having been taken at "Lake Umbagog, New Hampshire," the locality later being verified by Brewster (1924: 186) who pointed out that the bird had been shot about 200 yards west of the Maine boundary, in the Township of Cambridge, New Hampshire. As in the case of the Brewer bird, mentioned above, this one also was accompanied by a Snow Goose.

Sheld Duck

Tadorna tadorna (Linnaeus)

Hypothetical. Included (*in* Gross, 1948b: 71) in a list of birds "observed by Mr. Byron W. Barker at Verona Island [Hancock County] in the Penobscot River between May 30 and September 1, 1948," is "Sheld Drake (*Tadorna tadorna*)." No further details about it are given.

Common Mallard

Anas platyrhynchos platyrhynchos Linnaeus

Transient, uncommon in spring and fall throughout, except sometimes rather numerous in fall at Merrymeeting Bay; *winter resident,* uncommon but regular along the coast; rare in *summer,* with no nests reported.

Spring. Whereas some wintering birds may move about in the Portland region as early as mid-March when the weather is warm and sunny (Norton), migration occurs throughout April and to at least May 8.

Fall. The southward movement probably occurs in October. During some recent years, many Mallards have gathered at Merrymeeting Bay, the first birds usually arriving about September 1, with the population increasing until the third week of the month, and the last departing by October 27. Not over 200 have been reported from there for any single day.

Summer. The few summer records, which appear to be for wild birds, are for Penobscot and Washington Counties.

Winter. Small numbers occur regularly throughout this season on salt water at points along the coast into Washington County. The entire population probably does not exceed 100 birds.

Ecology. The Mallard is found on bodies of water of all sizes, from tiny ponds to large lakes, and from pond-holes in salt marshes to rather exposed coastal waters. It feeds in shallow water (under four feet) and along the shores. In the hunting season, the bird is very

wary and spends most of the daylight hours well out from shore on open water. It associates most commonly with Black Ducks, Pintails, and Ring-necked Ducks.

Remarks. At what is now Saco, York County, Christopher Levett (1628; 1847: 82) listed "ducks and mallard" among birds eaten in the winter of 1623–24. Since he was extolling the resources of the New World, and undoubtedly knew the Mallard in England, his inclusion of it may have been inaccurate and intended for home readers. Probably the first unquestionable mention of Maine occurrence is that of Audubon (1835: 164), who stated that this duck was rare east of Boston, and was not seen beyond Portland. It is certain that the Mallard never was common in Maine since records began.

At Scarborough, Loring shot thousands of game birds during the years 1842–1854, but his journals listed only seven of these ducks killed. Records of the Great Pond Club, at Cape Elizabeth, show two or three (once five) birds killed per year there from 1892 to 1903. Since then, and particularly since about 1916, there has been a gradual increase of both transient and wintering birds. Whereas two decades ago, Walch (1926: 10) stated that seldom was more than a pair found at Merrymeeting Bay, at present (1948) the species may be called numerous there, at least in some years.

Although the Mallard is not ordinarily a diving bird, Norton twice saw semi-domesticated ones diving in water not over four feet deep in a pond in Portland. On the first occasion, June 15, 1917, a bird made several dives and "once swam some distance under water," and on May 3, 1930, another made five ten-second submergences.

According to newspaper reports, about 200 of these ducks, raised at the state game farm at Dry Mills, were liberated in Maine in May, 1940.

A female, shot November 4, 1916, at Scarborough, was "gorged with seeds of *Zostera marina*" (Norton).

Black Duck

Anas rubripes Brewster

Summer resident, common to numerous throughout, except on some coastal islands; *transient,* abundant in spring and fall; *winter resident,* common to abundant coastwise, including waters about islands some distance from shore. Some individuals may be resident.

Spring. Migration begins in March when many wintering birds leave early in the month, most of these departing by the 25th. Other birds arrive from points farther south, largest numbers in southwestern

counties being seen from April 4 to 11, and migration continues throughout April.

Fall. In early August, family groups gather at favorable feeding places, probably not far from nesting sites. Before September 1, there is a definite population shift when numerous family groups join those at such places as Merrymeeting Bay and the Scarborough marshes. At the former locality, the population reaches its peak by September 25 and the last of the birds leave by October 24. In the meantime, other arrivals from northerly points begin to appear in early October, and migration continues to about November 24. Very often there is a sizeable flight in early November. Migration in this month is mainly, though by no means exclusively, restricted to coastal counties.

In his valuable study of this species, Hagar (1946a: 116, 124) concluded that many spring and fall transients take the direct route over water from Cape Cod to Nova Scotia and vice versa, thus bypassing Maine.

Flight years. Periods of unusual abundance in Cumberland County were: *1874*, in October, and *1908*, in mid-September (Rogers); *1924*, in November (Norton); and *1925*, from late March into April in upper Casco Bay (J. R. Wallace). The species was scarce in this county in the fall of 1912, and much more so in the fall of 1926 after a very cold spring (Norton).

Breeding. Adult Black Ducks pair in the winter months, thereafter traveling together even in flocks. In the breeding season, the species is found widely distributed on the mainland and on some marine islands. Although in New Brunswick, H. S. Peters (1941a: 4) found some nests in tree holes, and one in a Crow's nest overhanging a creek, all Maine nests for which I have data were located on the ground. Generally sheltered by shrubbery, nests are found in a wide variety of situations (often in woods), and, according to Mendall, may be located at points up to a mile away from water. (Also see Ecology.) The nest, in a depression, is composed of some grass, dead leaves, or other vegetation, and lined with much down from the parent bird. Clutches contain six to 13 (average nine plus) eggs (Mendall). Twenty clutches in coastal counties were completed from April 13 to May 14, but inland, laying continues into late May. Incubation (28 days, though perhaps variable) begins after the last egg is laid. Mendall found that young are fledged in 55 to 60 days, a period which is considerably longer than stated in published reports. One brood is raised yearly.

Winter. Black Ducks have wintered regularly at Back Cove, Portland, at least since the early 1870's, but not in any numbers until about 1910. Norton's monthly censuses at this locality for the years

1927 to 1937, in which there are gaps, show great variation from year to year. On January 3, 1931, he estimated 6,800 birds present; on January 25, 1936, 240 birds; and on January 28, 1937, only 331. He found that the population in the middle of February was consistently lower than a month earlier.

Winter is perhaps the most interesting season to watch these birds, since posturing and display are most in evidence in January and February.

Ecology. Contrary to widespread belief, these birds often nest in woods and, not infrequently, at considerable distances from fresh water (Mendall). Gross (1945c) found that on some marine islands where this duck nests, there was no regular supply of fresh water. Nests on low ground often are destroyed by spring floods, this factor being the outstanding cause of nesting failures.

This duck is gregarious outside the nesting season; it associates mainly with other dabblers. In July and August there is a molting period when many marshy pools and quiet coves are literally covered with shed feathers. At this time, the flightless adult birds, if pursued, may run into bordering thickets or woods to hide. Such pools and coves, providing favorite foods, continue to be frequented until covered by ice. During the hunting season on tidewater, these ducks spend most of the day at sea, coming in at night to feed along the shores, in shallow water, and on the flats. In winter they feed on roots of vegetation on the flats, or even on drifting seaweed (Norton). Large wintering flocks, near islands some miles out from shore, have been observed feeding about kelp-covered ledges when the tide was low.

Remarks. Black Ducks have bred on Maine islands for a long time. The earliest published reports are by Dutcher (1902: 45) and Norton (*in* Dutcher, 1904: 149, 150, 156). Recently Gross (1945c) has reported finding eggs, young, or other evidence of breeding on 11 different islands. These range from Casco Bay into Hancock County, including offshore No Mans Land in the Matinicus group.

The following data are from the journals of three hunters whose shooting was done mainly at Scarborough: Loring shot 339 birds from 1842 to 1854, or an average of 26 per year; in ten different years from 1866 to 1899, Rogers shot 85 birds, never getting over 16 in one season until 1899 when he bagged 26, and for every year from 1900 to 1912, averaging over 78 per season, he shot a total of 1,018 birds, the yearly bag consistently high until 1911 and 1912 when it fell to 40 and 45 birds; and Pillsbury shot 340 birds in 19 different years between 1892 and 1912, from one to nine in the years prior to 1903, with 43 in that year, and over 30 per year thereafter, except for a low of nine birds in

1906. Although there are a number of variable factors in these records, an increase in numbers of the Black Duck, beginning about 1900, is evident.

Norton (1915b: 501) briefly mentioned the increase in this species. In 1916, spring shooting was abolished, and five years later, Norton (1921: 357) wrote that the species had "increased greatly" and bred throughout the state in large numbers. Still later (1928b: 455), he reported that they were nesting in places where seldom seen a decade earlier. This increase finally ceased some time in the late 1920's or early 1930's, when a very marked decline began. By 1938, the population showed noticeable recovery. Numbers were fairly stable from 1941 to 1944 (although somewhat higher in 1942), with a decrease beginning in 1945 and continuing in 1946, and, although breeding pairs increased in 1947, floods destroyed a great many nests (Mendall). The Black Duck is the most abundant duck in Maine.

Favorite feeding places, like Merrymeeting Bay, provide an abundance of such foods as various sedges, wild rice, bur-reed (*Sparganium* spp.), broad-leaved pondweeds (*Potamogeton* spp.), and smartweed (*Polygonum* spp.). According to Knight (1908b: 84), the Black Duck feeds "on a great variety of vegetable matter, tender roots and buds of aquatic plants, grass roots in the meadows, and insects, being also decidedly partial to frogs, tadpoles and even small minnows. I have known individuals to . . . gorge themselves with huckleberries in late August." He also mentioned (ibid. 85) that two birds, killed in winter near Bucksport, Hancock County, had eaten the fruit of "*Lepargyraea Canadensis* Nutt., a northern shrub not known from this particular region."

Norton (1909f: 439) wrote that birds "taken on the outer islands off the coast in winter have been found to be chiefly fed upon *Littorina palliata* [a mollusk]. A specimen taken on the Presumpscot River, in Windham, late in November, was gorged with a fresh water snail (*Campeloma decisa*). Two specimens taken on tide water at the mouth of the same river, in the fall, had their gullets filled with seed of eel grass (*Zostera marina*) and a few isopods (*Idotea marina*)."

Observations on feeding habits, made the third week in March, 1938, at Big Spoon Island in eastern Knox County waters, were recorded by Norton in his notes as follows: "A flock of about 15 birds rested on the upland, or among the soggy depressions lately uncovered of snow and drained by the porous soil. Here numerous elliptical holes, wider than high, were burrowed through the tangle of short grass to the underlying soil, showing where they had been probing for tender shoots and other edible substances."

At Back Cove, Portland, an incomplete record of winters when

sustenance of these birds was largely dependent on human aid, is as follows: 1911–12, 1917–18, 1919–20, 1922–23, 1924–25, 1929–30, and 1947–48. The second winter mentioned was by far the most severe; at least several hundred birds would have died had they not been fed. There is now a "Black Duck Fund," donated by interested persons, to buy food for these birds.

Most young birds in early fall weigh 1¾ to 2½ pounds, averaging somewhat over two pounds. Larger birds, shot later, occasionally weigh up to 4¼ pounds. About seven ducks yield a pound of feathers, and about 25 pounds generally are used for a feather mattress.

Gadwall

Anas strepera Linnaeus

Transient, one record for spring and occasional in fall. Has occurred in Cumberland, Sagadahoc, Washington, Piscataquis, and Aroostook Counties.

Spring. Two were shot on April 29, 1879, at Scarborough (Smith, 1882–83: 125).

Fall. Records are from September 12 to November 8. The two earliest are for one seen on September 12, 1933, at a small pond in Township 3, Range 11, west of Mt. Katahdin (Palmer and Taber, 1946: 303), and one shot on September 14 of unstated year at Merrymeeting Bay (Walch, 1926: 11). Other records are from September 24 to October 29, with these two later ones: a male shot on November 7, 1904, at Windham, Cumberland County (Norton, 1916: 380); and a young male shot on November 8, 1927, at Falmouth, in the same county (Rich).

Flight year. A small flight occurred in late October and early November, *1904*, as reported by Norton (ibid.).

Ecology. This is a dabbling duck, found in quiet waters, such as river mouths and estuaries. It is found where there is more cover than is characteristic of the Baldpate, and less than is ideal for the Black Duck. Associates include the Black Duck, Pintail, and Blue-winged Teal.

Remarks. Records indicate a slight increase of this species, and I am inclined to believe that this is due to more birds rather than to more accurate reporting.

The two inland records include the bird seen near Mt. Katahdin, cited above, and about a dozen birds, in singles and pairs, seen on September 27, 1934, on the Aroostook River, by Dr. E. G. Rowland.

Boardman first (1862: 129) called this bird rare about Calais, and

later (*in* Baird, Brewer, and Ridgway, 1884, 1: 508) stated that it was "not uncommon in the fall in the vicinity." Still later (Boardman, 1903: 312), he wrote: "Very rare; accidental." Possibly the second report of "not uncommon" was occasioned by a small flight one fall.

DeKay's statement (1844: 343) that this species bred in Maine was perhaps a misinterpretation of Audubon's mention (1838: 353) of occurrence from Eastport, Maine, to Texas. Brewster (1883c: 162) took exception to the statement in Stearns and Coues (1883: 308) that this bird "very probably breeds in the swamps of Maine."

American Pintail

Anas aeuta tzitzihoa Vieillot

Transient, occasional to numerous in spring and fall, mainly in coastal counties; *winter resident,* common to numerous in Back Cove, Portland, and perhaps occasional elsewhere on the coast; rare in *summer,* not known to breed.

Spring. Most transients are seen in late March and the first half of April. The earliest record believed to refer to transients is for a male and female shot by Spinney on March 5 or 6, 1901, at Phippsburg, Sagadahoc County. Latest dates are May 7 of unstated year, at Merrymeeting Bay (Walch, 1926: 12), and May 9, 1945, at Calais (Mendall).

Fall. Migration lasts from late August to late November, with most birds seen during the last three weeks of September. "I have often found one or two Pintails among the early flocks of Blue-winged Teal coming into Maine in late August" (Mendall). Four of these ducks were seen on salt water on August 29, 1941, at Petit Manan Point, Washington County (Weston). A late date for well inland is Brewster's (1924: 124) record of a bird shot on October 20, 1884, at the mouth of the Cambridge River in Upton, Oxford County.

Flight years. In *1939,* unusual numbers were present in September and October in Waldo, Sagadahoc, and Cumberland Counties (various observers); in the fall of *1944,* the flight was noticeably larger than usual in northern, eastern, and central Maine (Mendall).

Summer. Records are: one seen on June 28, 1935, one or two in June, 1936, and one on August 16, 1938, at Jackman, Somerset County (A. R. Phillips); and a female seen on July 26, 1945, near Calais (J. M. Dudley).

Mendall has found no evidence of breeding. The species was first found breeding in New Brunswick in 1938.

Winter. The first wintering record was for a drake seen February 15, 1912, between Falmouth and Portland, in Casco Bay (Norton, 1912a). Later, Norton (1933c) reported that, beginning in the winter

of 1927–28, this species was a "regular winter resident" at Back Cove, Portland. Such has been the situation to the present time, with usually 8 to 30 birds remaining there. In the winter of 1930–31, unusual numbers remained, and on November 15, Norton saw 85 birds; on December 1, 28 birds; on January 3, "not less than 40"; and on January 18, "about 50." I am of the opinion that a few birds now winter occasionally east of Casco Bay, though the only substantiating evidence is a bird shot January 4, 1939, on Great Cranberry Island, Hancock County, reported by Tyson and Bond (1941: 54).

Ecology. Inland, this gregarious species is found on fairly large expanses of water or marsh, and not in small areas surrounded by trees, which are part of the Black Duck's habitat. It occurs often on brackish and less often (except in winter) on salt water. It feeds mostly on submerged vegetable material, by 'up-ending' in shallow water, and its relatively long neck makes it readily adapted to this type of feeding. Associates include the Black Duck, Mallard, teal, Gadwall, and, especially, the Baldpate.

Remarks. Gunners' records and other data indicate that the Pintail was regularly uncommon, with a fairly stable population from at least as far back as the 1860's down to the 1930's. A definite increase began some time in the latter decade, with more transients being seen. The species is present in greater numbers, and is more widely distributed, in fall than in spring.

Josselyn (1674; 1865b: 80) reported that among birds seen during his years at Scarborough were "grey *Duck*" and "*Smethes.*" Either might have the Pintail, but unquestionable is mention of the species by Williamson (1832: 141, 142).

Boardman (1862: 129) gave the status of this duck, in the Calais region and mouth of the Bay of Fundy, as "Winter. Rare." Later, Boardman (*in* Baird, Brewer, and Ridgway, 1884, 1: 514) reported only fall occurrence, so the earlier report, having been reconsidered, furnishes no certain evidence of wintering at that time in the area.

Phillips (1923: 309) discounted several published reports that this duck bred in eastern Canada; he included the report of M. Chamberlain (1882: 58), which, to some authors, had implied breeding, but was actually an early fall (September) record, for New Brunswick. In the summer of 1938, H. S. Peters (1939) found a nest with ten eggs on June 6, and other evidence of breeding in Westmorland County in this same Province. By 1940, there was a colony of about 30 pairs, and indications that another might be starting in central New Brunswick (H. S. Peters, 1941a: 4).

There is an early spring date for the Grand Manan archipelago, New Brunswick. This is for a female taken on March 2, 1918 (Pettingill, 1939a: 324).

European Teal

Anas crecca Linnaeus

Three records of adult male specimens. Norton (1943a) acquired a mounted bird without data, probably taken in the late 1870's or early 1880's, and of "local origin" [Cumberland County]. One was taken on April 6, 1903, "in Casco Bay" (Brock, 1907); another was taken a day or two prior to March 26, 1910, at Scarborough (Norton, 1911a). All are now in the Portland Society of Natural History.

Green-winged Teal

Anas carolinensis Gmelin

Transient, occasional to common in spring and common to numerous in fall, with the larger numbers in coastal counties both seasons; occasional *summer resident*, undoubtedly breeding in Hancock, Penobscot, and Washington Counties; two *early winter* records.

Spring. Transients generally are noted from about March 20 to April 29, largest numbers being seen the first ten days in April. Early records are for a female shot on March 14, 1910, at Scarborough (Pillsbury), and two the following day at Cape Elizabeth (F. Conant). This teal arrives April 17 to 29 at Presque Isle (Chamberlain), perhaps depending on how early there is much ice-free water. Latest records are for seven birds seen on April 29, 1943, at Merrymeeting Bay (Gross), and 15 on April 29, 1944, at Bangor (Weston).

Fall. As with many other ducks, there is a local movement in August when birds appear in localities where they do not nest. For example, several were seen on August 15, 1938, at Great Pond on Petit Manan Point, Washington County (R. McClanahan), and Weston has seen them there a number of times the last week of the month. A few transients are noted by September 4, but most are seen from September 20 through October, with declining numbers to November 15. Late occurrences are: one shot on November 22, 1913, at Cape Elizabeth (Norton); about 50, with Black Ducks and American Goldeneyes, on November 22, 1946, on the St. Croix River at Baring, Washington County (Mendall); and one seen on November 29, 1941, in Penobscot County (Weston).

Flight years. In *1874*, this bird was "unusually abundant" in fall near Portland (Mac, 1874); *1908*, "most ever seen" in fall, probably at Scarborough (Rogers), and 31 recorded shot in one day by members of the Great Pond Club at Cape Elizabeth; *1924*, a "heavy flight" on

November 5, at Falmouth, Cumberland County (B. E. Smith); and in *1941*, the flights of both species of teal were "the heaviest in this section [Washington County] I have ever recorded" (Mendall).

Breeding. The nest, a depression in the ground, contains some vegetable material and is lined with down from the duck. Although Samuels (1867: 494) thought that this teal probably bred in his time in northern New England (as it did even then in New Brunswick), no Maine record was established until July 25, 1940, when a female with a brood of "five or six young about five weeks old" was found on Dead Stream in Township 33, Hancock County, and reported by Mendall and Gashwiler (1941: 401). "Breeding records have since been obtained in Penobscot and Washington Counties" (Mendall). On June 18, 1947, a nest containing nine eggs was found in the Moosehorn Refuge at Baring, Washington County (Mendall). The incubation period, variably reported outside of Maine, is probably 21 or 22 days, with fledging requiring six weeks or less. One brood is raised yearly.

Winter. Early winter records are for several seen on December 26, 1940, on Mt. Desert Island (Tyson and Bond, 1941: 54), and a drake seen on December 30, 1941, at Blue Hill, Hancock County (Weston).

Ecology. Data from outside Maine indicate that nesting is in dry localities, sometimes under brush for concealment, and usually near water but occasionally a considerable distance away. As a transient, this teal occurs on fresh, brackish, and salt water, as well as in salt marshes. In summer, it is a fresh water bird. It feeds mainly on emergent and floating vegetable matter, and often is noisy and active when feeding on moonlit nights. Most common migrant associates in Maine are the Black Duck and Blue-winged Teal.

Remarks. According to M. Chamberlain (1882: 58), the Green-winged Teal was a common summer resident in New Brunswick. Forbush (1912: 92–93) cited reports which showed that, about 50 years earlier, the bird was plentiful in Massachusetts. Maine shooting data, beginning about 1870, indicate that seldom was it even locally common for a day in any season. The species continued to decrease at least up to 1916 when spring shooting was abolished, and any recovery in population was not apparent until the early 1930's. In the last six or seven years, the increase in transients has been marked and, undoubtedly, can be correlated with an increasing breeding population in the Maritime Provinces, Newfoundland, and adjacent areas. At the present rate of expansion of this bird's summer range westward, we may have breeding records for one or two additional Maine counties in a few more years.

At present the relative status of the Green-winged and Blue-winged Teal in migrations is as follows. The former greatly outnumbers the latter in spring. In fall, the Blue-wing comes early and occurs in numbers in favored localities. The Green-wing arrives later, is of more widespread occurrence, and usually does not concentrate in such numbers as does the Blue-wing. Taking the season as a whole, it is a question as to which species is present in larger numbers in fall.

Nominal mention of "green wing'd" Teal by Josselyn (1674; 1865b: 80) is the earliest Maine record of this species.

An early spring date for the Grand Manan archipelago is for a male taken on March 1, 1916 (Pettingill, 1939a: 324).

Blue-winged Teal

Anas discors Linnaeus

Transient, fairly common in spring and numerous in fall, mainly in coastal counties; *summer resident,* uncommon but regular in eastern and northern counties (Washington, Penobscot, Aroostook, Somerset, Waldo, and probably Hancock) and occasional elsewhere (records for Oxford and Cumberland).

Spring. In coastal counties, most transients are seen from April 13 to May 4. Very early dates are for a duck shot on March 8, 1902, at Georgetown, Sagadahoc County (Spinney, 1902b: 43), and one seen on March 13, 1904, at Cape Elizabeth (Rogers). Arrival dates for Presque Isle range from April 28 to May 18 (Chamberlain). Occasionally small flocks linger at Merrymeeting Bay until mid-May.

Fall. There are local movements, beginning in early August, when these teal gather in flocks at places where food is plentiful. The general southward movement, not much in evidence until after August 20, reaches a peak between September 4 and 17, and most birds depart by October 7. There are several records for as late as November 7 in southwestern counties, and later ones are: three seen on November 8, 1941, on Corinna Stream, Penobscot County (Mendall); and, one, believed to have been of this species, seen on November 19, 1939, on Isle au Haut, one killed on November 26, 1917, on Monhegan and sent to a Portland taxidermist, and a specimen taken on December 1 of unstated year in Cumberland County (Norton).

Flight years. In *1904,* gunners found this teal more numerous in early September than for a decade, in Cumberland County (Norton), and large numbers were reported at Merrymeeting Bay (Noble, 1905a: 10–11); *1927,* unusual numbers were present in fall at Merrymeeting Bay (Spinney); and in *1941,* there was a heavy fall flight in Washington County (Mendall).

Breeding. The nest, a depression in the ground, contains a rather substantial layer of grass, leaves, or other plant material, and is lined with down from the duck. The following specific records for Maine, though few, indicate the span of the nesting season. A duck with nine young was seen the last week in May, 1936, on an inlet of Mayfield Pond in Mayfield Township, Somerset County (G. R. Meyer); on May 29, 1945, a nest containing 12 eggs (one taken had a 12-day embryo) was found on Stratton Island, Scarborough (Gross); on June 1, 1945, a nest with six eggs was found at Calais, and five more eggs were added later (Mendall); on June 9, 1937, a nest with 12 eggs was found at Calais (G. Swanson); and from June 16 to 19, 1934, a duck with six young was observed at Kezar Pond, Fryeburg, Oxford County (H. Maynard). Outside of Maine, Kortright (1942: 208) has reported that incubation requires 21 to 23 days and that the young are fledged in six weeks. One brood is raised yearly.

Ecology. This gregarious and unwary bird usually is found on fresh or brackish water in migration, but also occurs on sheltered areas of salt water. During the breeding season, it generally nests in dry localities, the nest being well concealed, near fresh water. It feeds mainly on surface and emergent vegetation. On August 21, 1940, near Portland, Norton watched a flock of 13 birds feeding "very busily on the surface, on masses of algae, and not tipping up at all." Most common associates are the Black Duck and Green-winged Teal.

Remarks. The Blue-wing was reported as an abundant bird in fall, in the 1870's, by Brewster (1924: 119) and others, but the situation was not of long duration as Maine shooting data show. During the month of August, this bird was a choice target for the many men and boys who engaged in hunting shorebirds for the market. In the 1880's, a brace of teal, sent to Boston, brought $1.25, and data show reports like the two gunners on Cape Elizabeth who bagged a "bushel basket heaping full" of teal out of one day's flight (G. E. Cushman), and the Freeport boy who killed 24 birds with two shots and 29 with five (W. C. Kendall). As a result of such heavy shooting, numbers in fall were sadly reduced by 1885. Whereas the records from 1885 to 1902 or later indicate a few more Blue-wings than Green-wings killed, it seems that both were about equally scarce in fall in that period.

As to spring records, so rare was the Blue-wing, that Smith (1882–83: 125) wrote: "I know of but a single instance of the occurrence of this species in spring. The late Caleb G. Loring, Jr. shot one at Scarboro, Me., April 28, 1859." In the period from 1895 to 1904, only two are known to have been shot at the Great Pond Club on Cape Elizabeth.

It is probable that, in Smith's time, spring transients followed a

different route—perhaps crossing the Gulf of Maine—for there is evidence that some birds reached the Calais and Bay of Fundy region during this period. In his 1862 list for this area, Boardman (1862: 129) mentioned spring and fall occurrence, and the following year, he (Boardman, 1907: 96) shot an adult and three "young" on August 13. Samuels (1867: 495–496) stated that Boardman had found this bird and young at Milltown, Maine, and two decades later, Baird, Brewer, and Ridgway (1884, 1: 533) cited Boardman as authority for this species breeding in the vicinity of Calais, though it was not common. In his later list, Boardman (1903: 312) gave its status as: "Common; breeds."

Beginning in the decade after 1900, there appears to have been a slight increase, especially in fall, but these were mostly transients, until, I would guess, at least 1925. Aldous and Mendall (1940: 22) wrote: "As a resident bird in Maine, the blue-winged teal has long been found largely in the eastern part of the State, but in recent years it has been observed breeding in scattered areas throughout northern and eastern Maine." At present, in early fall before gunning begins, one can expect to see 1,500 to 2,000 of these birds at Merrymeeting Bay. For the relative status of this species and the Green-wing during migrations, see Remarks under the latter.

Mention of "blew wing'd" teal by Josselyn (1674; 1865b: 80) is the first Maine record of this bird.

Widgeon; European Widgeon

Mareca penelope (Linnaeus)

Transient, one record for spring and occasional in fall. All specimen records are for Cumberland, Sagadahoc, and Washington Counties, and one report for Lincoln County.

Spring. An adult male was shot on April 19, 1926, at Falmouth, Cumberland County. It was reported erroneously as "seen" on April 20 of that year by Norton (1933d).

Fall. All specimen records, from September 20 to "a few days" after December 7, are as follows, chronologically by year: a female, September 20, 1911, at Swans Island, Bowdoinham, Sagadahoc County, and another female, November 13, 1912, at Scarborough (Norton, 1913: 574); a young male, October 29, 1917, at Scarborough (Norton, 1933d); a female, late October, 1923, at Merrymeeting Bay (Walch, 1926: 11); a male molting into adult plumage, December 7, 1923, at Falmouth, a "very similar specimen" taken "a few days later" at Cape Elizabeth, and a male and female, November 14, 1930, at

Scarborough (Norton, 1933d); and a young male shot on October 8, 1948, at Alexander, Washington County, by J. Dudley (Mendall).

Ecology. This bird is found in a habitat similar to that of the Baldpate, with which it often associates.

Remarks. Although Maine records show no definite trend, this species probably is increasing gradually. No doubt records are missed by gunners who do not recognize this duck.

That "a flock of 21 birds alighted in a pond near the house," as reported by A. L. Carter of Jefferson, Lincoln County, in a letter dated November 26, 1924 (Hasbrouck, 1944a: 98), seems questionable to me.

A male was shot on October 12, 1890, just across the border in Errol, New Hampshire (Brewster, 1924: 113–114), and another on November 1, 1927, at Nantucket Island in the Grand Manan archipelago, New Brunswick (Pettingill, 1939a: 324).

Baldpate; American Widgeon

Mareca americana (Gmelin)

Transient, uncommon, seen more often in fall than in spring, in coastal counties, and rare in inland parts of Penobscot County and in Oxford.

Spring. Although most transients are seen from March 23 to April 12, there are these earlier records: N. C. Brown (1884) examined, on February 20, 1884, an adult male, dead "several days," which had been sent to Portland from Freeport, Cumberland County, and, because the season had been mild, felt that the bird "should be regarded as an early migrant rather than as a winter resident."; a male seen on March 12, 1942, in Back Cove, Portland (Norton); and one shot March 13, 1904, at Scarborough (Rogers). Latest occurrences are: April 15, 1916, at Merrymeeting Bay (Walch, 1926: 11); and May 4, 1947, at Back Cove (Haven *in* Gross, 1947f: 31).

Fall. Most birds are noted from September 27 to November 7, with occasional occurrences in December in Cumberland County. Early records are all for single birds shot at the Great Pond Club at Cape Elizabeth, on September 2, 1909, September 6, 1904, and September 7, 1899. The latest date is for a young male shot on December 7, 1923, in Falmouth, Cumberland County (Norton).

Flight years. The shooting journal of Rogers listed 20 "widgeon" killed in the fall of *1902* in Scarborough. For the fall of *1904,* Noble (1905a: 12–13) reported flocks of 25 or 30 together at Merrymeeting Bay, six birds were shot by Rogers at Scarborough, and 21 birds were bagged by members of the Great Pond Club at Cape Elizabeth.

Ecology. This species, generally found on more open water than is the Black Duck, feeds where there is little emergent vegetation, but much floating and submerged food—particularly broad-leaved pondweed (*Potamogeton* spp.). Although this implies a fresh or brackish water habitat, the Baldpate also occurs on fairly sheltered salt water bays. When they occur in any numbers, these birds are generally in flocks rather than singles or pairs. Associates include Pintails, Widgeon, and teal. In other parts of its range, this species is noted as a parasite on several diving ducks, seizing the plant material which the latter bring to the surface in their bills.

Remarks. For the 13 years, 1842 to 1854, Loring shot 82 "widgeon" at Scarborough; year-by-year data are lacking. Records, often overlapping, of Smith, Rogers, Pillsbury, and the Great Pond Club, all for Cumberland County, show a very uniform yearly kill from 1868 to 1910. Shooting data for more recent years are lacking. Considering the above, however, plus recent sight and scattered specimen records, it appears that there has been no marked population change in the past hundred years.

Inland records include a few occurrences in parts of Penobscot County, and, farther inland for Oxford County, a report of being "very rare" (Nash *in* Knight, 1897d: 29; 1908b: 86), and the few Umbagog records of Brewster (1924: 114–116).

The crop and gizzard of a female, shot September 28, 1880, at Spednic Lake, Vanceboro, Washington County, were "full of green leaves" (Hardy).

Two males weighed 20 and 22½ ounces (Norton).

Mention of "*Widgeons*" by Josselyn (1674; 1865b: 80) is not a certain first record of this bird in Maine. More satisfactory is inclusion in the list of Holmes (1861a: 121).

Shoveller

Spatula clypeata (Linnaeus)

Transient, rare in spring and fall, recorded for Oxford, Cumberland, Sagadahoc, Hancock, and Washington Counties.

Spring. Most records are for the second half of April. The earliest one is for a drake shot on April 7, 1879, on Stratton Island off Scarborough (Smith, 1882–83: 125), and the latest for a drake seen on May 2, 1933, at Back Cove, Portland (Rich).

Fall. Most records for this season are scattered rather evenly through September and October. The earliest is for a bird shot on August 24, 1895, at Scarborough (Pillsbury), and latest ones are for

two ducks shot on November 3, 1928, at Merrymeeting Bay, one five days later at Falmouth, Cumberland County, and a duck received on November 10, 1924, in fresh condition from Merrymeeting Bay, by a Portland taxidermist (Norton).

Flight years. Small flights have occurred in: *1881*, in spring (N. C. Brown, 1881; Smith, 1882–83: 125); *1923*, in fall (Rich; Spinney); and *1928*, in fall (Norton; Spinney).

Ecology. Generally this bird is found in brackish waters near the coast, but also has occurred on fresh and on sheltered salt water areas. It is a surface feeder, roiling muddy shallow water and straining this mixture through the 'sieves' in its bill. Data from outside Maine show that the food thus secured is partly animal matter (including snails and insects) and partly vegetable (including seeds of sedges, pondweeds, and grasses). The Shoveller is not markedly gregarious with its own kind or other species, but has been seen in Maine with Blue-winged Teal and Black Ducks.

Remarks. This duck probably does not occur in Maine every year. Records, in recent decades, indicate that it occurs more often in fall than in spring. It was being seen with increasing frequency in the 1920's, and although I believe such an increase has continued to the present, I do not have adequate data to prove this point. I find no evidence that it ever was numerous in Maine.

Boardman was consistent in considering the species rare at Calais, but Brewer, probably in error, stated (*in* Baird, Brewer, and Ridgway, 1884, 1: 528) that it occurred "in small numbers, in spring and fall" in that vicinity.

The farthest inland record is that of Brewster (1924: 123), who stated that the bird was "exceedingly rare" in autumn at Lake Umbagog.

Since scaups sometimes were called "shuffler," Josselyn's mention (1674; 1865b: 80) of "*Shoulers* or *Shoflers*" cannot be called a definite record of the present species. More certain is inclusion in the list of Holmes (1861a: 121).

On January 5, 1935, a male was taken on Nantucket Island in the Grand Manan archipelago (Pettingill, 1939a: 325).

Wood Duck

Aix sponsa (Linnaeus)

Summer resident, uncommon to fairly common throughout the mainland and perhaps occurring rarely on larger inshore islands; *transient*, common in spring and fall on fresh and brackish waters, and rare on sheltered salt water areas.

Spring. Most transients are seen from April 2 to 23, with highest numbers occurring the second week in the month. The earliest record is for three seen by Norton on March 22, 1894, at Westbrook, Cumberland County, and there are numerous late March records even eastward into Penobscot County. Earliest arrival date at Presque Isle is April 11 (Chamberlain). Late migrants are noted until about May 14.

Fall. Most birds depart between September 15 and October 20, with a few sometimes lingering until November 1. Late dates are for a "good number" seen on November 7, 1936, at Kezar Pond, Fryeburg, Oxford County (H. Maynard), and 20 seen on November 8, 1940, on Corinna Stream in Penobscot County, and five seen on November 21, 1938, at Princeton, Washington County (Mendall).

Flight years. I find no records of occurrence in unusually large numbers. It was much scarcer than usual in the spring of 1945, and scarcer still in 1946, in northern and eastern Maine (Mendall).

Breeding. The nest tree may be standing in water, or may be several hundred yards from it. Usually the nest is in a hollow limb or trunk, the entrance being 5 to 50 feet above ground. The cavity usually contains some rotted wood, and is lined by the duck with down as laying progresses. Eight to 12 eggs are laid at a rate of one per day; much larger clutches probably are the eggs of two ducks laying in the same nest. Infertile eggs are common. In Maine, laying probably begins the first week in May, and occasionally in April since Brewster (1924: 127) found newly hatched young at Lake Umbagog on June 1, 1880. He also (ibid. 126–127) recorded finding ten fresh eggs there on May 21, 1880, and seven on May 23, 1881. Incubation, by the duck, is variably reported outside of Maine as lasting 28 to 32 days. J. C. Phillips (1925: 61) pointed out that incubation is longer than in other surface-feeding ducks, requiring 30 to 32 days; he agreed with Heinroth, who gave 26 days for the Mallard, that the Wood Duck takes at least five days longer. Occasionally the drake is in attendance at the nest tree.

For the first few days of their lives, the ducklings have very sharp claws. After a day or two in the nest, they leave with or without a signal from the duck, their claws enabling them to climb up the wall of the nest cavity to the opening, from which they jump to the ground or water. If the nest is back from shore, the duck leads the young to water, where, occasionally at least, both parents accompany the brood. The young fly when between eight and nine weeks of age. One brood is raised yearly.

Ecology. The preferred habitat of this bird is streams, ponds, and coves about lakes, bordered or shaded by deciduous or mixed woodlands. This duck is a surface feeder and dives very infrequently.

Sometimes, when not feeding, a flock may bask in the sun, with eyes closed and bills tucked under scapulars, but usually they are found in shaded spots. At Merrymeeting Bay, most Wood Ducks are seen about inlets or in sheltered coves, rather than in the wild rice beds out in open water. This preference for shade correlates with their crepuscular feeding habits and unusually large eyes. Audubon (1835), Brewster (1924), and J. C. Phillips (1925) have commented on the poor vision of this bird in daylight, and on its excellent sense of hearing.

These ducks are agile on land. I have flushed them from under oaks, where they were walking about, eating acorns, on islands in the Androscoggin River below Brunswick. I have also seen them perching on limbs, horizontal or at various angles, as well as on tops of small stubs. One early July afternoon, at Pushaw Stream in West Old Town, Penobscot County, I flushed 23 of these birds from a fairly sizable and densely-foliaged maple.

Singly or in flocks, this species does not associate closely with other waterfowl. Even in the cases of rare salt water occurrence during migration, the Wood Ducks seen or shot were not in company with other ducks.

Remarks. As early as 1889 a marked decrease in the population of this bird in Maine was noted, being attributed to over-shooting and, to a lesser degree, to netting (Norton). Numbers did not decline greatly at Umbagog until the turn of the century, and, after another decade of gunning, Brewster (1924: 125) used the expression, "approaching local extinction," to describe conditions there. The situation grew so acute that, by 1911, when Maine enacted a four-year period of protection, persons regularly afield were fortunate if they saw one or two birds a year. The Wood Duck was placed on the list of totally protected species by the Federal Government in 1918. This closed time was continued until recently, when one Wood Duck per day has been allowed as the legal quota. Considering the great increase during the years of protection, the fact is obvious that over-shooting, rather than changes in forest conditions or lack of nest sites, was the primary cause of the near extirpation of this bird from Maine.

The nesting situation of these birds may act somewhat as a limiting factor in their numbers. The hollows used may be natural ones, or old cavities made by Pileated Woodpeckers. I have been told of Wood Ducks coming down chimneys, and of one once coming into an old barn and laying eggs on the hay. During lumbering operations in former years, when many lakes and ponds were dammed, large numbers of trees were killed by flooding and, when decaying, provided numerous nest sites. Most of these have now passed the useful stage, so that a shortage of cavities exists. Perhaps the increasing Pileated Wood-

pecker population in southern counties will help the situation there. In these counties, however, Gray Squirrels undoubtedly compete for some of the small cavities, whereas in the northern part of the state, the Hooded Merganser is a competitor, and throughout the state the Raccoon is an occasional one for the larger holes.

In regard to the shortage of nesting sites, Aldous and Mendall (1940: 25) wrote: "As lack of nesting sites is often a serious hindrance to wood ducks, a special effort should be made by farmers and timberland operators to leave standing a few hollow trees or trees with hollow limbs along the shores of wooded lakes and streams. Since these ducks sometimes nest in bird boxes, such artificial houses could be put up in areas where there is a deficiency of nesting sites."

Many Wood Ducks are caught in spring in muskrat traps. Some of those caught are not injured too badly to be released again. The number lost from this cause certainly is far less than the number formerly shot in fall and thrown away during the years of complete protection.

Norton (1909f: 439) reported bulbs of arrowhead (*Sagittaria* sp.) as food of this duck in Maine. His notes also record a drake, shot October 5, 1939, at Merrymeeting Bay, as having its gizzard a quarter full of seeds of wild rice (*Zizania aquatica*).

Examples of local concentrations of these birds are: about 125, in small flocks at Great Pond, Cape Elizabeth, on September 16, 1930 (Norton); and 180 (and all present not counted) at one time, in the fall of 1936, at Kezar Pond, Fryeburg, Oxford County (H. Maynard).

During fall banding operations, weights of an unstated number of Wood Ducks were recorded, the range being 16 to 29 ounces (Gashwiler and Marsh, 1940: 10). "Bands from three immature Wood Ducks banded on the Penobscot River near Howland [Penobscot County], Maine, between September 26 and September 28, 1939, were secured respectively at Olamon Stream, Penobscot County, Maine, on October 7, 1939; at St. Mathews, South Carolina, on February 12, 1940; and at Centenary, South Carolina, on December 25, 1939" (ibid. 11).

On April 7, 1882, a duck and drake were shot on offshore Matinicus Island, Knox County, the occurrence being so unusual that "none of the gunners had any name" for the birds (Hardy).

Redhead

Aythya americana (Eyton)

Rare *fall transient*, records being for Oxford, Cumberland, Sagadahoc Kennebec, Knox, Penobscot, and Washington Counties; one certain *spring* record for Cumberland. No records for over a decade.

Spring. A pair of these birds was shot on March 27, 1905, at Scarborough (Norton, 1916: 380). Maynard and Brewster (1871: 384) reported rare spring occurrence in Oxford County.

Fall. Most birds have been seen between September 13 and October 31. An early record is for a male shot on August 19, 1876, at Cape Elizabeth (N. C. Brown). Late records are for a female shot on November 3, 1916, at Scarborough, and five birds shot on November 13, 1912, at Cape Elizabeth (Norton).

Flight year. Unusual numbers were present in late October and November, *1904*, at Merrymeeting Bay (Swain, 1904b: 16; Noble, 1905a: 12) and in the vicinity of Portland (G. Cushman).

Ecology. This is a gregarious species, usually occurring in pairs or flocks, on fresh or brackish water. Food, both vegetable and animal matter, is secured by diving in three to ten feet of water. A favorite food is the leaves, fruits, and submerged parts of wild celery (*Vallisneria spiralis*). Although I have no Maine data on migrant associates, the Redhead probably accompanies Lesser Scaup Ducks, as is often the case elsewhere.

Remarks. Samuels (1867: 507) wrote: "I found several specimens of both sexes in the Umbagog Lakes in June; and I think it not impossible, that, if it does not breed there, it will be found to breed in some of the lake regions of northern New England." Boardman (1871c) reported that he had found a pair of these ducks breeding "near Calais," and that this was the first time he had found the species in summer. Brewer (*in* Baird, Brewer, and Ridgway, 1884, 2: 37–38) stated: "Mr. Boardman informs me that in the summer of 1871 he found a pair of Red-heads which were evidently breeding in the vicinity of Calais, Me. . . Its nest and eggs were afterward, in the summer of 1874, actually found by Mr. William Bryant about thirty miles north of Calais. The presence of this bird about Calais had been previously noted by Mr. Boardman during each summer, and he had not doubted that a few pair remain about there for the purpose of rearing their young." Boardman (1903: 312) later listed this bird as: "Rare; breeds."

The Redhead population never has been large in Maine, as the state lies east of its migration route. At Scarborough, Loring shot 14 birds in the years 1842 to 1854. Two dozen were killed from 1892 to 1908 by members of the Great Pond Club on Cape Elizabeth. There often have been several years when few or no individuals were noted, but that there have been no records recently for more than a decade indicates a more than ordinary period of low numbers or absence. Even in times of scarcity, however, one should be on the lookout for breeding Redheads in the same places where the Ring-neck nests. An

alleged 1931 breeding record for the present species is discussed under the Ring-necked Duck.

The locality for the one definite spring record, cited above, was given erroneously as Portland (*in* Brownson, 1906d: 66).

On July 7, 1944, a female and eight downy young, less than a week old, were found near Maugerville, New Brunswick (Mendall, 1945a). Perhaps more unexpected is the record of a female shot on January 4, 1906, near Grand Manan, in the same province (Pettingill, 1939a: 325).

Ring-necked Duck

Aythya collaris (Donovan)

Summer resident, fairly common at suitable localities in Oxford, Franklin, Somerset, Piscataquis, Penobscot, Aroostook, Waldo, and Hancock Counties, and very common in Washington; *transient*, common in spring and fairly numerous in fall throughout; one *early winter* record.

Spring. Migration occurs chiefly in April. Early dates are: two seen on March 19, 1947, at Pembroke, Washington County (J. M. Dudley); three seen on March 20, 1942, at Frankfort, Waldo County (Weston); and 17 seen on March 29, 1945, at Milford and Greenbush, Penobscot County (Mendall). Chamberlain's earliest arrival date at Presque Isle is April 12. Late dates are for a drake shot on May 1, 1879, at Scarborough (N. C. Brown, 1882f: 2), and several seen each day on June 12, 13, and 16, 1947, in Lincoln County (Cruickshank).

Fall. Migration is preceded by local movements in which these ducks concentrate at favored feeding places. On September 17, 1886, a young male was shot on the Cambridge River, Oxford County (Brewster, 1924: 140), another was taken on September 19, 1919, at Merrymeeting Bay (Walch, 1926: 13), and on September 24, 25, and 26, 1939, J. A. Hagar saw about 200 there. The main southward movement occurs throughout October and early November. Late inland records, all for Penobscot County, are for about 40 birds seen on November 1, 1941, at Eddington (Weston), between 30 and 40 seen on March 6, 1937, at Eddington Pond (Eckstorm), and 50 seen on November 8, 1940, on Corinna Stream (Mendall). Late coastal records are for two birds shot on November 18, 1913, at the Great Pond Club on Cape Elizabeth (Norton), and a very late occurrence on November 22, 1938, at Edmunds, Washington County (Mendall).

Flight year. An unusual number was taken in the spring of *1882* in Cumberland County (N. C. Brown, 1882e: 190; Smith, 1882-83: 184).

Breeding and summer. In Maine, according to Aldous and Mendall (1940: 32–33), this duck "shows a tendency to postpone nesting until late in May or even early in June. . . The nests are constructed among reeds or bushes within a few feet of open water. Sometimes, in fact, they are completely surrounded by water, and it is necessary for the birds to build up the base in order to keep the nest dry. Small bushy islands are favorite nesting sites." [Clutch size, incubation period, and many new data are given in a paper by Mendall, now (1948) being written.]

That some birds nest earlier than is indicated above is shown by the few data at hand: nine eggs, advanced in incubation, on June 10, 1941, at Eddington (Eckstorm); three eggs of a clutch pipped on June 18, at Calais, and a brood about four days old on June 23, 1945, at Crawford, Washington County (J. M. Dudley); numerous downy young in June, 1947, at Snake Pond, South Brooksville, Hancock County (K. Tousey); and a female with brood of young on August 6, 1936, at Grassy Pond in Township 4, Range 13, Piscataquis County (Swanson, 1937). Fledging probably requires two months. One brood is raised yearly.

A pair of Ring-necks was seen July 4 to 9, 1946, at Pemaquid Sanctuary, Bristol, Lincoln County (Cruickshank), which is outside the known breeding range.

Winter. A bird, capable of flight and apparently in good health, was seen December 11 and 26, 1938, at Little River, Scarborough (Norton; J. F. Fanning).

Ecology. Brewster (1924: 142) wrote that "the Ring-neck—unlike both species of Scaup—habitually shuns open water far from shore, except when seeking temporary asylum there; that its favorite haunts are weedy or grass-grown shallows in flooded marshes, along the margins of rivers and in small ponds and lagoons—even those buried deep in forests."

Remarks. Boardman (1862: 129) listed this duck as "Rare. Does not breed" in the vicinity of Calais. Several years later, in a report paraphrasing a letter from Boardman, it was stated that he had found "several flocks of the Ringneck Duck, *Fulix collaris*, breeding on the [St. Croix] river, near Calais, the past season, and that he secured the old and 'chicks.' He states that he knows of no other instance of this duck breeding in New England" (Boardman, 1871a). Fuller details were published in the 1870 correspondence between Boardman and S. F. Baird (*in* Boardman, 1903: 178, 179, 204, 205). Boardman was authority for the statement in Baird, Brewer, and Ridgway (1884, 2: 27) that this species "is seen every summer in the vicinity of Calais, and that it breeds there." Later, in a reprint of a list published in

1899–1900, Boardman (1903: 312) wrote: "Not uncommon: breeds."

That this duck continued to breed in the St. Croix region during Boardman's time is shown by Squires (1946), who listed four sets of eggs collected by Boardman on May 29 (two sets) and 31, 1874, and May 13, 1876, at St. Stephen, New Brunswick. One set of four, collected on May 29, is now in the New Brunswick Museum (ibid.). The other May 29 set was listed among accessions as "Four eggs of the Ring-necked Duck (*Fulix collaris*) from Milltown, Me." in the *Annual Report* of the Smithsonian Institution for 1875 (p. 74). The May 31 set is probably the 1874 record referred to in Baird, Brewer, and Ridgway (1884, 2: 27) as consisting of eleven eggs found in a nest "among reeds and thick grass on the banks of the St. Croix River." This last mentioned set and the May 13 one were both presented to the United States National Museum by Boardman (Squires, 1946). Squires was of the opinion that this species continued to breed in the general region around Calais, and that the gaps in the record were due to lack of observers.

As to other parts of Maine at this time and even later, we have a picture of rare occurrence which, from the literature, appears to have been due to an actual scarcity of the species rather than to lack of competent observers. For Norway, Oxford County, A. E. Verrill (1862a: 153) wrote: "Spring and fall. Not common." Smith (1882–83: 184) considered the Ring-neck uncommon and irregular, and wrote of a number (over six), shot in the spring of 1882 in Cumberland County, as an unusual occurrence. For the years 1886 to 1895, Brewster gave five fall occurrences at Umbagog, two of which were for young males, one taken on September 17, 1886, and the other on September 25, 1894.

That part of Norton's files covering the period from about 1900 to the early 1920's shows the same picture of scarcity, with almost all records being for fall birds. After this, the Ring-neck began to occur more frequently. During the period from 1929 to 1933, I used to see a few in April at a place called Hildreth's Shore in Topsham on the Pleasant Point road to Merrymeeting Bay. Usually eight to a dozen birds lingered there for several days.

On August 14, 1931, Major G. R. Meyer told Norton that, a week earlier, he had seen a female "Redhead" with nine half-grown young at Kingsbury Pond, which lies partly in Kingsbury Plantation, Piscataquis County, and partly in Mayfield Township, Somerset County, and that they had been seen there at other times. There is a report of nine young "scaups" seen with the female parent at Fryeburg, Oxford County, given in John B. May's mimeographed *Items of Interest*, dated August 6, 1932. There is little doubt that both

records, identified as species in which the females are very similar to the Ring-neck, actually refer to the present bird. For one thing, neither Redheads nor the scaups are known to breed in Maine, and, for another, the Ring-neck subsequently was found nesting in both localities mentioned.

Chamberlain (1935: 316) saw four Ring-necks May 26 and 27, 1934, at Mud Pond near Ashland, Aroostook County. The late May date of this occurrence would seem to indicate nesting. It was not until 1937, however, that the first breeding record based on actual specimens was published, by Swanson (1937), since Boardman's time. This was the female and young, mentioned under Breeding, which were found August 6, 1936, at Grassy Pond. On August 17, two of the young were collected and positively identified. During this year, two persons reported to Norton that the Ring-neck had been breeding for several years in the vicinity of Fryeburg.

By late 1938, Mendall had found the species nesting in Aroostook, Washington, Penobscot, and Piscataquis Counties. His data (Mendall, 1938) summed up the increase of this bird in summer in the east, including Maine and the Maritime Provinces. Two years later, Aldous and Mendall (1940: 31) stated that this duck "is now a regular migrant throughout Maine and is well distributed as a summer resident in the northern and central parts of the State."

The year 1940 was the first in which there was a marked increase in summering birds in western Maine (Mendall). Yearly fluctuations are apparent already, since, according to Mendall, the species was not as numerous in 1941 as in 1940. On the whole, however, the general trend of nesting birds has been upward, the Ring-neck being more numerous than the Black Duck in some localities.

Canvasback

Aythya valisineria (Wilson)

Transient, rare in fall (records for Oxford, Cumberland, Sagadahoc, Kennebec, and Washington Counties), and one spring record for Washington County; one *winter* record. No records since 1942.

Spring. A pair was seen at close range, April 13 to 15, 1938, on Maguerrewock Stream, near Calais (Mendall).

Fall. Most occurrences have been in the last half of October and the first week of November. The earliest is for four taken "about the eighth of October, 1896," at Nahumkeag Pond, Pittston, Kennebec County (Norton, 1916: 380), and the latest is for a drake shot on December 21, 1916, near Baileys Island, Casco Bay (Walch, 1926: 12).

Winter. Two drakes were seen on February 24, 1933, in Back Cove, Portland (Norton).

Ecology. This duck is a subsurface feeder, diving for submerged plant materials in fresh, brackish, and salt water. A favorite food is wild celery (*Vallisneria spiralis*). I have no data to indicate that this species associates with other ducks in Maine; in fact, the contrary appears to be the case.

Remarks. The status of this duck in fall seems not to have changed appreciably during the past 75 years. Norton (1916: 380–381), in compiling all available records of occurrence from about 1874 through the fall of 1915, listed 31 birds killed and two others seen. A number of early records have since come to light, including 15 birds shot, from 1842 to 1854, probably all in Cumberland County, by Loring.

On November 4, 1942, six of these ducks were seen on the St. Croix River between Calais and Baring, by Lloyd Clark. A duck and drake were shot from this group and are in Clark's collection. Four days later (November 8), Clark saw about 25 at the same locality. These data, from Mendall, are for the most recent occurrence of the species in the state, insofar as records go.

A male, shot October 26, 1896, at Levant, Penobscot County, had eaten wild celery (Gould, 1896).

For corrections of records published by Knight (1908b: 97), see Norton (1916).

Greater Scaup Duck

Aythya marila nearctica (Stejneger)

Winter resident, numerous to abundant, chiefly in sheltered salt water bays; *transient,* numerous in fall and early spring, mainly in coastal counties.

Fall. Most birds arrive during the last half of October and the first half of November. At Merrymeeting Bay, "this duck may be seen from September 1, until the latter part of October or the first of November, [and] a few may remain until the latter part of November" (Walch, 1926: 13). Brewster (1924: 138) recorded having seen a duck on September 22, 1889, on the New Hampshire side of Lake Umbagog.

Winter. Flocks are found from Casco Bay eastward. There is considerable shifting or wandering of local populations, probably caused by a fluctuating food supply.

Spring. Birds depart in March and early April, although a few linger regularly until the last week in April. Late records are: May 14, 1922, at Merrymeeting Bay (Walch, 1926: 13); a male seen on May 16, 1931, at Back Cove, Portland (Norton; Rich); another there

on May 24, 1939 (Norton); and a record for May 28, 1916, at Merrymeeting Bay (Walch, 1926: 13).

Ecology. This is a gregarious duck. It feeds by diving in fresh, brackish, and salt water of shallow depth. The two scaups commonly associate with each other, forming sizable flocks or 'rafts.'

Remarks. This species has decreased markedly as a wintering bird in the past 30 years. More have always wintered in southern New England than along our coast. During the winter of 1933–34, unusual numbers were noted in Casco Bay, having been driven out into the open by ice forming in coves and sheltered places (J. R. Wallace; Norton).

Both scaups were notably scarce at Merrymeeting Bay in the fall of 1905 (Noble, 1905d: 65). Whereas they were reported by some observers as very common along the coast of eastern Maine in the fall of 1940, Mendall noted that actually there was a definite decrease from the previous year.

The stomach of a winter male from the Fox Islands, Phippsburg, Sagadahoc County, was filled with shells of *Macoma balthica* (Norton, 1909f: 439).

On April 30, 1939, Norton timed 50 submergences in rather turbid water in the Androscoggin River at Brunswick. The dives ranged from 6 to 20 seconds, averaging 14, with 26 dives from 10 to 15 seconds.

Lesser Scaup Duck

Aythya affinis (Eyton)

Transient, common to numerous in fall and early spring, chiefly near and on the coast; rare *winter resident* coastwise.

Fall. Most transients are seen in October and early November. The earliest specific record is for one shot on September 16, 1923, in Merrymeeting Bay (A. Ridley). Late dates are for about 20 seen on November 16, 1942, near Calais (Mendall), and a young male shot on November 17, 1919, at Westbrook (F. Babb).

Winter. A. G. Dorr took specimens near Bucksport, Hancock County, in the winter of 1897 (Gardner, 1899). Thirty-one were seen by Maurice Sullivan during the 1938 Christmas census on Mt. Desert Island (Tyson and Bond, 1941: 54).

Spring. Records range from March 14, 1910, for a female shot at Scarborough, to May 4, 1947, for a pair seen at Pembroke, Washington County, by Mendall, who had first noted the pair on April 30. On April 10, 1945, Mendall saw about 40 on Corinna Stream, Penobscot County, the only flock he saw in the interior during that month.

Ecology. See the preceding species, from which the present one differs chiefly in showing a greater preference for fresh water.

Remarks. Apparently the Lesser Scaup never has been as common as the Greater Scaup in Maine, so that its decrease in the last few decades, though less noticeable than that of the latter, has been proportionately as great or even greater.

This species was notably scarce in the fall of 1905 at Merrymeeting Bay (Noble, 1905d: 65); the 1939 fall flight in eastern Maine was much smaller than that of 1940 (Mendall).

American Goldeneye

Bucephala clangula americana (Bonaparte)

Resident (locally migrant); in summer, a fairly common breeder in unsettled inland areas, with non-breeders uncommon along the coast from Muscongus Bay eastward, and in winter, common to abundant coastwise and common inland wherever there is open water. Probably many are transients, in spring and fall, and also winter residents from outside the state.

Spring. In late February, numbers in southwestern coastal waters show an increase, which continues into late March. Throughout the latter half of March and to about April 20, birds move to inland waters as the ice breaks up. Small flocks, perhaps chiefly first-year birds, linger on salt water into May.

Fall. Most of the migratory movement occurs from October 10 to November 20, the peak coming in early November. Many inland birds, when frozen out, go to the few swift streams which remain open, or to the coast.

Breeding and summer. The nest is in a cavity, from 5 to 60 feet above ground, in a hollow tree. It may be shallow or at a depth of 5 or 6 feet from the entrance, and usually, but not always, is lined with down. Eight to 12 eggs usually are laid; Brewster found 5 to 19 at Umbagog, the latter number he believed to have been produced by one duck. Completed clutches are found in Maine from May 10 to 18. Incubation has been reported variably, outside of Maine, as lasting 20 to 30 days. One clutch under observation on the Penobscot River in 1946 was incubated more than 30 days before hatching (Mendall). The male often remains near the nest. The ducklings remain in the nest a day or so and then, on signal from the duck, climb up the wall of the cavity to the entrance and drop to the ground or water. Fledging probably requires about two months. One brood is raised yearly. These ducks breed in their second summer.

Non-breeding birds are uncommon on the coast from Muscongus Bay eastward. Occasionally, one or two are seen in Merrymeeting Bay in August and early September.

Winter. This duck winters wherever it can find open water, small flocks remaining inland on rapids in streams and rivers. The majority of them are, of course, to be found on salt water at this season. Part of our breeding population undoubtedly moves out of the state, and some birds from north and east of Maine winter with us.

Ecology. In spring these ducks search for hollow-tree nesting sites about lakes, ponds, rivers, and even small streams. Unlike the Wood Duck, this species does not nest at any distance from water. It feeds primarily over a soft bottom in 5 to 18 feet of water, and moves forward slightly while submerged. On marine waters, it feeds in shallow, quiet waters in harbors, coves, reaches, and sheltered areas inside of bars. When driven out of these areas by ice, it appears to manage quite well in feeding over a hard bottom along outer shores. This species is found on the same waters with scaups, Buffleheads, American and Hooded Mergansers, but usually keeps apart from them.

For Lake Umbagog, Brewster (1924: 143) wrote: "They obtain most of their food by diving not far from shore, in open water ranging in depth from two or three to eight or ten feet, but sometimes seek it on or very near the surface, in grass-grown shallows. As a rule they are decidedly less gregarious than most Ducks, rarely consorting with any of the others, and not often forming flocks which contain more than eight or ten birds of their own kind, while very many of them are found singly or in couples. This unsocial tendency is most pronounced in late summer and early autumn. It is by no means confined to old birds, for the young almost invariably scatter widely before the first of August, when scarce half-grown and wholly incapable of flight, yet quite able, it would seem, to get their own living."

Remarks. Aside from the fact that the wintering population in the Portland region increased steadily from 1935 to 1941 (Norton), not much is known about past fluctuations of this bird in Maine. It is the fourth most numerous species of duck found in the state. Twelve years after the ending of spring shooting, Norton (1928b) remarked that it was extending its breeding range in the state. About Mt. Katahdin, it was found regularly during the ten years before 1932, and less frequently since then (Palmer and Taber, 1946: 304). In 1947, Mendall wrote me that there had been a "noticeable decline in breeding Goldeneyes in Maine for the past four years." One of the greatest factors in the ecology of this bird is lack of sufficient nesting sites. As it occupies nestboxes much more readily than does the Wood Duck, this lack can be remedied in some localities.

Fairly large concentrations of this species, usually caused by local weather conditions, are noted occasionally. One of these was reported for January, 1925, on the lower Kennebec River (Spinney), and on March 17 of the same year, thousands of Goldeneyes gathered in upper Casco Bay (J. R. Wallace). During the last week of December, 1933, when various inner coves and narrows were ice-bound, great numbers gathered in lower Portland Harbor (Norton).

A wide variety of food is eaten, comprising both animal and vegetable matter. Norton (1909f: 439) noted seeds of eelgrass (*Zostera*) and shells of two snails (*Lacuna vincta* and *Margarita helicina*), which are associates on the eelgrass. His later notes list sculpin eggs as common food. Knight (1908b: 101) mentioned watching these ducks fish for mollusks in rapids and rips, where they also obtained "a shiny vegetable substance of undeterminable nature. They also eat the smaller fish . . . and will not disdain trout fry on occasion. Along the coast practically the only food I have found in their stomachs consists of mussels and other mollusks which they obtain by diving and swallow bodily, shell and all." Brewster (1924: 145) saw one feeding in shallow water at Umbagog in October, and on shooting it, found "in its stomach a mass of waterbeetles, but no traces of other food."

Norton timed 64 submergences in 5 to 18 feet of water, finding a range of 7 to 36 seconds. One series of 12 dives in 6 to 9 feet of water, over a level bottom, varied from 22 to 36 seconds. One bird dove 15 times, in fresh water 3 to 12 feet deep, the range being 7 to 25 seconds with an average of 11.

Mixed sets of Goldeneye and Hooded Merganser eggs are found quite often, but the Wood Duck lays with this species less often. A hybrid, between a Hooded Merganser and American Goldeneye, was shot on May 2, 1854, at Scarborough, by Loring. This bird was described by Dr. Samuel Cabot (1856), and has been described further and figured by Ball (1934). The mounted specimen is number 17972 in the collection of the Boston Society of Natural History.

According to Brewster (1924: 149), Goldeneyes often may practice polygamy. On one occasion, seeing two females emerge from a cavity in rapid succession, he suspected that perhaps the two ducks were incubating, alternately, the same clutch. Interested persons should read the excellent breeding data on this species by Brewster (1900; 1924: 147–162).

Gunners do not make very large kills of this duck. The 398 shot by Loring from 1842 to 1854 is exceptional.

Displaying and posturing are in evidence to some degree in December and January, and very noticeable during February and early

March. The following data are condensed selections from Norton's observations at Back Cove, Portland. December 8, 1938—Three males and two females swam in one direction for some seconds, then turned and went back on the same course. The males had heads erect, with necks slanting forward; suddenly one drake after another threw his head back on the rump, and as suddenly thrust it forward. The leading duck dove and the others followed suit. January 11, 1940—Two males rushed at each other several times, but dove just before colliding and swam off a short distance. On emerging, each bird would thrust his head back, then resume a normal position and feed a while before repeating the performance. Another male, in a sort of crouching posture with head stretched forward, swam about in this position for many minutes, interrupting to throw its head back several times or to dive. February 12, 1941—The birds showed a tendency to gather in small, compact groups. One group started swimming and one of its members began displaying. This drake put his head forward at a slight angle, then jerked it forward three or four times and raised it slowly to a vertical position. He then jerked it vigorously back, bringing the crown on his rump; the bill was open. The head was then brought forward vigorously and the bird resumed a normal position. "The vigor of this forward thrust may bring into function the collapsible bulb of the trachea, to produce a sound." February 13, 1931—A flock of about 80 was observed, near noon, strung out in a line on the lee shore and not diving, but performing their courtship antics with vigor. March 8, 1940—A duck swam, neck stretched forward, with a drake in pursuit. The male overtook and mounted the female, grasping her head with his bill and forcing her completely under water. She soon stood somewhat erect, so that both birds were at a 45-degree angle with the surface. They then parted.

Barrow's Goldeneye

Bucephala islandica (Gmelin)

Winter resident, uncommon on salt water from Penobscot Bay eastward, in lesser numbers westward to Scarborough, and rare on fresh water; *transient,* uncommon in late fall and early spring on salt water, and rare inland.

Fall. Migration occurs mainly in the latter half of November. A very early occurrence is that of an adult male shot on September 18, 1927, at Maquoit Bay near Brunswick, Cumberland County, and from which I made a sketch. Other early records are: two seen on October 24, 1940, at unstated place on the Penobscot River (Mendall

in Hasbrouck, 1944b: 549); an adult male shot on November 5, 1929, at Freeport, Cumberland County (Norton); two shot on November 12, 1923, at Maquoit Bay (Walch, 1926: 13); an adult male seen on November 14, 1928, at Portland (C. M. Mower); and an adult male shot on November 14, 1940, at Indian Point on Mt. Desert Island (Bond).

Winter. This species should be looked for wherever the American Goldeneye winters. Records indicate that small numbers winter regularly on salt water in Penobscot Bay, in Hancock County, and in Washington. Norton, by getting heads of female and young goldeneyes from gunners, established the fact that the present species was by no means as rare in Cumberland County as had been supposed. In all probability, a similar check would prove that this duck occurs in greater numbers at the places mentioned above than present records indicate. Brower and others (1939) reported having seen about 25 at Mt. Desert Island on December 24, 1938. An inland record is for a male and several females seen on December 25, 1937, in the Penobscot River at Enfield, Penobscot County (O. K. Scott).

Spring. Most birds depart during the first 20 days of March. Later records are: seven seen on March 24, 1945, at Middle Bay, Cumberland County (C. Packard); an adult male shot on March 26, and a young male on the 28th, in 1912, at Scarborough (Norton, 1913: 575); specimen taken on April 10, 1885, and another on the same date in 1888, at Bar Harbor on Mt. Desert Island (Hasbrouck, 1944b: 549); one seen on April 12, 1939, at Blue Hill, Hancock County (Mendall *in* Hasbrouck, ibid.); three seen on April 15, 1947, and two on April 23, 1946, at Maguerrewock Stream, Calais (Mendall); a specimen taken in April, 1896, at Bucksport, Hancock County (Hasbrouck, 1944b: 550); and an inland record for a specimen taken on May 10, 1882, at Milford, Penobscot County (ibid. 549).

Ecology. Whereas records to date seem to indicate that this duck is more partial to salt water than is the American Goldeneye, perhaps if both species were present in equal numbers, their habitat in the non-breeding season would prove to be identical.

Remarks. Early references to breeding in Maine may be considered erroneous. T. M. Brewer (1879c: 149–150) wrote: "In Maine and New Brunswick a few pairs are found each summer undoubtedly breeding, though no nests have been detected, as far south as the forty-fifth degree. Mr. George A. Boardman informs me that they are somewhat rare in the neighborhood of Calais, but become much more common on the St. Croix River in the winter." Later (*in* Baird, Brewer, and Ridgway, 1884, 2: 43), Brewer made practically the same statement, giving Boardman as authority for a few seen each summer

near Calais, but no nests having been found. These data were used by Elliot (1898: 180). Boardman (1899a) reported that, 50 years earlier, this duck had nested rarely on the St. Croix River, and later (1903: 312), gave as its status: "Common in winter."

I doubt that there has been any marked change of status of this duck in Maine over the past 60 years, but data are too incomplete to prove it.

A male in first winter plumage weighed 38 ounces, two adult males weighed 42 and 43 ounces, and several adult females ranged from 28 to 32 (Norton).

An interesting record is for a young male taken on March 3, 1882, at offshore Matinicus Island, and formerly in the Hardy collection.

Although Knight (1908b: 102) stated that this bird was present only in the "very height of winter," records given above show occurrence over a longer span of seasons.

Bufflehead

Bucephala albeola (Linnaeus)

Winter resident, common to numerous, mainly on sheltered salt water areas; *transient,* uncommon to common in fall and spring on fresh water inland, and in greater numbers coastwise; in *summer* (not known to breed), occasional inland, and rare along the coast.

Spring. Migration occurs in late March and throughout April. Late records are for 17, apparently first-year birds, seen on May 3, 1936, in Back Cove, Portland (Norton), a pair seen on May 4, 1926, on Back River at Georgetown, Sagadahoc County (Spinney), and two females seen on May 15, 1938, at Perry, Washington County (Mendall). Early May inland records are perhaps for summering birds (see Summer).

Fall. Birds arrive on salt water from about October 14 to November 20, and the population does not show an increase after the latter date. Earliest record for the Portland region is for a bird seen October 7, 1931, in Johnsons Cove (Rich).

Flight year. On October 22, *1930,* about 2,000 birds, "the largest number that I have ever seen," were at Back Cove, Portland (Rich).

Summer. Although it seems probable that this species has bred rarely in Maine, there is no certain breeding record (see Remarks). Brewster (1924: 163–164) reported seeing two ducks and a drake on June 1, 1880, on the Cambridge River in Oxford County, under circumstances which led him to believe the species was breeding there. In July, 1921, J. F. and W. Fanning saw nine of these ducks at Daicy

(sometimes spelled Daiecy or Daisy) Pond in Township 3, Range 10, Piscataquis County (W. Fanning, 1921: 77). Two were seen in early June and to July 11, 1937, on the Medomak River in Lincoln County (Cruickshank).

Winter. Flocks are found on sheltered salt water all along the coast.

Ecology. This active little bird generally is found on the quiet shallow (three to ten feet) water, over soft bottom, of reaches, sheltered coves, and bays. The feeding depth is usually four to six feet, and the water so shallow that the flats beneath are exposed for an hour or more at low tide. Here, the Bufflehead finds crustaceans, worms, and other food. Submergences are brief and the birds emerge at nearly the same spot where they go under. Mendall quite often has found these ducks associating with American Goldeneyes, more often in fall than in spring. Single birds occasionally are seen with Hooded Mergansers.

Remarks. Although Boardman made no mention of breeding in his 1862 list, undoubtedly he was the source of the following reports: "summer resident (Me.)" (T. M. Brewer, 1875: 448); a few "remain and breed, nesting in trees," near Calais (Baird, Brewer, and Ridgway, 1884, 2: 50); and, "Breeds from Maine" (Elliot, 1898: 186). Boardman later (1899a) stated that, 50 years earlier, this duck nested on the St. Croix River; he made no mention of contemporary breeding. Then, in a list first published in late 1899 and early 1900, he (Boardman, 1903: 313) gave its status as: "Common spring and fall; breeds." In 1940, Aldous and Mendall (1940: 26) stated that a "few of the birds probably breed in the northern part of the State," but Mendall recently (1948) wrote me that he was beginning to doubt this.

Because of the Bufflehead's habits of gathering in compact groups and of feeding close to shore, it formerly was one of the principal targets of young gunners. It was greatly reduced in numbers before 1890. "The Bufflehead . . . has become so rare that seldom is there heard of a specimen being taken" (Spinney, 1901: 54). With spring and winter protection, this duck began a slow but steady increase which became noticeable in the early 1930's, at a time when the population was dangerously low in other parts of the bird's range. From 1935 to 1940, the increase, although not great, was most pronounced, and it has continued at a slower rate since. This duck was markedly more numerous in northern and eastern Maine in 1940 than for several years preceding and the year following (Mendall).

At Back Cove, Portland, Norton timed about 60 submergences in 6 to 10 feet of water, finding a range of 5 to 23 seconds with most dives at 12 to 18.

A great deal of display and posturing are observed in January and

February, and by March, most of the birds are paired. The male often swims about the female, with head forward at an angle, bobbing it up and down, displaying the conspicuous white patch. In another display, the male swims along with neck stretched forward and bill on the water, then suddenly jerking the head upwards and backwards, and returning to the outstretched position. They often interrupt such posturing to make short flights over the females. (Summarized from various observations by Norton.)

The "Divers or *Didapers*" of Josselyn (1674; 1865b: 80) probably were either Buffleheads or Hooded Mergansers—most likely the former.

The description of habitat as among breakers and near rocks, as given by Walter Rich (1907a: 355), certainly is not typical of this species.

Oldsquaw

Clangula hyemalis (Linnaeus)

Winter resident, abundant on salt water; *transient,* abundant in spring and fall coastwise, and occasional in spring and uncommon in fall inland chiefly on the larger bodies of water; a few are seen in *summer* along the coast.

Spring. The population on our coast increases in March and early April when birds arrive from southerly points, and many flocks move into bays in the latter month. They are very restless for some time before departing, large flocks often circling for hours; this has been described by Mackay (1892: 331), as observed at Scarborough, and at Saco in York County. The birds depart from about April 20 to May 20, going overland at a high altitude, with few stopping at inland points. Late dates for large numbers in Cumberland County waters are: May 22, 1929 (J. R. Wallace), and May 23, 1869 and May 24, 1876 (Smith). Occasional transients are seen in this region until the end of May.

Fall. Although small flocks occasionally are reported on salt water the first week in October, most of the birds arrive from October 20 through November. Early dates for sizable flocks are October 12, 1920, for Casco Bay (Norton), and October 19, 1897, for Seguin (Spinney). The earliest inland record is for six seen October 2, 1944, at Jackman, Somerset County (W. Foerster).

Summer. There are reports of breeding, but these are too indefinite to include here. (See Remarks.) Some specific records for summer are: two (one injured) seen on June 2, 1940, and a female seen on June 19, 1937, at Scarborough (Norton); a male, apparently healthy

and in the "breeding plumage" as pictured in Forbush (1925: pl. 16), seen on June 20, 1941, at the Bangor-Brewer dam on the Penobscot (Weston); a male seen on June 27, 1931, at Green Island, off Petit Manan Point, Washington County (Norton); one seen on July 5, 1938, in Muscongus Bay (Cruickshank); a female seen on July 9, 1931, off Whitehead Island, Knox County (Norton); a flock of 35, of which 18 were shot, on July 18, 1868, at Libby River, Scarborough (Smith); unstated number present through June and July, 1947, in Muscongus Bay (Cruickshank); a female seen from July 30 to August 2, 1938, at South Brooksville, Hancock County (K. Tousey); a female seen on July 31, 1938, at the Heron Islands, Phippsburg, Sagadahoc County (Palmer); two seen on August 19 and 20, 1941, at Scarborough (Norton); one with scoters on August 28, 1937, in Mt. Desert Narrows (T. Eliot); and one seen on September 15, 1941, at Scarborough (Norton).

Winter. At this season, flocks of varying size are found the length of the coast, mainly outside of harbors and other sheltered waters.

Ecology. The Oldsquaw is one of our strongest divers, and most independent of depth of water and character of bottom. Feeding places commonly noted are: over a hard bottom where kelp grows (to about 18 feet depth); near rocky shores where *Fucus* is the characteristic growth (three to nine feet); in harbors over *Zostera* beds (five to 18 feet); and off sandy beaches on our southwestern coast. These ducks also feed in much deeper water, although less often. Much of the food eaten is gasteropod mollusks and amphipod and isopod crustaceans, some of which live on or among the plant growth just listed, and others swim near the bottom along the sandy beaches and submerged bars.

Although Oldsquaws and other seafowl are seen in 'rafts,' observations show that this gregarious duck keeps within its own group in a 'raft,' and does not mingle closely with the others.

Remarks. Job Rackliff, who had an exceptional knowledge of seafowl, told Norton that, in the 1860's, he found a nest and six eggs by the roots of a spruce tree, at Lobster Cove on Sprucehead Island, Knox County. David Leavitt, of Cape Elizabeth, saw a female with six small young, in July, 1878, off Watt Ledge near the Cape. Less definite is a gunner's report that a brood was seen in July, 1918, at Scarborough (Norton). There are other indefinite reports. Knight (1908b: 104) wrote: "The few individuals which remain all summer along the coast are crippled or otherwise barren birds which never show any indication of breeding with us, and such as have been dissected by me were physically unable to breed."

For the several decades prior to the 1890's, there are reports of

flocks of thousands of Oldsquaws 'bedding' in the bays in early spring. There was a marked decline in numbers, however, so great was the slaughter of these unwary birds. With the abolition of winter and spring shooting, numbers have increased and the characteristic spring gatherings are again a feature of our coast. Large numbers have been noted in Casco Bay in some springs since 1927. This species is now second to the Black Duck in abundance in Maine.

For the period from 1842 to 1851, Rogers shot 378 Oldsquaws; from 1891 to 1912, Pillsbury's journal listed 282 killed. This is chiefly for the Scarborough region and does not represent concentrated gunning for this duck, which is a poor table bird. Gunners used to go in parties for a week of seafowl shooting, often killing large numbers of 'coots' [scoters], Oldsquaws, and eiders. Willard (1895: 164) reported such a trip, about 1884, to Wood Island, Casco Bay, on which 372 birds were killed, mostly Oldsquaws, there being only 16 'coots.'

Adult males average about 36 ounces and females 28, and 16 birds yield a pound of feathers (Norton).

An interesting note on behavior is from E. D. Rackliff, who, many years ago, observed Oldsquaws flying to Bay Ledge buoy, off Isle au Haut, where they would dive to feed. On one occasion the buoy came loose and drifted into very deep water, but at the usual time the ducks came to the buoy to feed. Upon diving, however, they found the water too deep and soon flew away.

This species was recorded first for Maine by Josselyn (1674; 1865b: 80), who included "*Hounds*, old *Wives*" among the seafowl. The appropriateness of the former name is evident to anyone who has heard the voices of the drakes, or who has noted mention of "bugling" in gunners' journals.

H. Herrick (1873: 38) saw a pair in "full breeding plumage," which were shot on June 18, 1872, in the Grand Manan archipelago, New Brunswick, and concluded that the species might be breeding there.

Eastern Harlequin Duck

Histrionicus histrionicus histrionicus (Linnaeus)

Winter resident, fairly common, a few flocks found at only three or four localities (outer islands and ledges) eastward from western Penobscot Bay, and occasional farther westward; *transient*, occasional in spring and fall on salt water; one inland record.

Fall. Harlequins arrive from October 18 to November 15. An early date is October 10, 1924, when an adult male was shot at Richmond Island, near Cape Elizabeth, and the latest fall occurrence for the

western half of the coast is for a bird shot on November 21, 1908, by Pillsbury, at Pine Point, Scarborough (Norton). At points away from the few wintering spots, and where seafowl are shot regularly, a Harlequin is taken about once in seven to ten years.

Winter. Small flocks (6 to 20 birds) are present every year at a few localities. The best known of these is Isle au Haut, where Harlequins have wintered regularly for at least 60 years.

Spring. The species departs from March 5 to 31. A female was shot on the late date of April 17, 1880, at Isle au Haut, and a male on the still later date of April 30, 1882, at nearby Swans Island (Hardy).

Ecology. This is a bird of the surf, little flocks diving in seaward 'gutters' or gulches, where the sea rushes in, or along rocky shores or ledges swept by the sea. Harlequins which are shot in areas other than the wintering grounds are usually in company with Oldsquaws.

Remarks. Manly Hardy's unpublished notes contain records of 88 Harlequins, shot and delivered to him in the flesh, from January 28, 1880 to November 10, 1882. Most of these were killed about Isle au Haut, but a few were taken at Swans Island to the eastward, at the offshore Matinicus Islands, and elsewhere in that general region. There were 61 males and 27 females, but these figures are no indication of sex ratio since, it was noted, gunners tried to kill as many males as possible. One female, a large bird in fine condition, had the normal color of the back of the head "intermixed with hoary." After handling these specimens, Hardy reported that he had seen more mended broken bones than in any other species with which he was familiar. This condition may have been a result of these birds' diving in turbulent water about ledges, as discussed below.

Norton (1896: 229–234) wrote of visiting, in February, 1894, some of the outermost islands in Penobscot Bay where these birds were found. Although not stated, these were Little and Big Green Islands and Green Island Seal Ledge, off South Thomaston, Knox County. Fred Rackliff, Norton's companion on the trip, "pointed out numerous gutters, where he said that when a youth he had seen 'Seamice' crowding in, when sad havoc was often made among them by the boy gunners. The older gunners seldom made any effort to take them, as they were of small value" (ibid. 233). Norton stated that this duck was common only on the "eastern half of the coast, where it is slowly but steadily decreasing" (ibid. 234). Although winter shooting long since has been abolished, this slow decrease, noted on the winter range, has continued to the present. It may be caused partly by illegal gunning or other factors at this season, or to factors operating at other seasons elsewhere, or a combination of these.

Hardy noted that the food of this species "consists almost entirely

of small marine shellfish," and mentioned that a female, shot January 21, 1881, in Jericho Bay, had eaten "periwinkles, small clams, sand fleas, and limpets." On December 27, 1919, at Great Spoon Island, east of Isle au Haut, Norton saw about 50 Harlequins, the largest flock containing 25 or 30 birds. Twelve were shot that day, the stomach contents of nine of these, showing numbers of individuals of various animals, being given in Table 1.

TABLE 1

Stomach Contents of Nine Eastern Harlequin Ducks[1]

Specimen no.:	1	2	3	4	5	6	7	8	9
Lepidonotus	1			tr.					
Orchestia ?			tr.						
Gammarus	3			tr.					
Gammarellus angulosus	m.	3	m.	m.	m.		tr.	tr.	m.
Pycnogonidae	tr.	1							
Chiton		3				1	1		
Acmaea testudinalis			5			1			
Littorina	1								
Purpura [*Thais*] *lapillus*	10+2 egg caps.	15	1+ frags.	4	13	20		6	
Buccinum endatum			3				2		
Mytilus edulis		10			4				
Lucina vincta	20	2	2	1	11	tr.	11		
Lucina margarita	8				2		14	1	
Saxicava	4		1	21+ frags.		2			
Asterias			tr.						
shell frags., mostly *Purpura*		m.				m.		tr.	

[1] Abbreviations: tr. =trace; m. =many; frags. =fragments; egg caps. =egg capsules.

Norton timed 25 submergences in and near surf in water of unknown depth. One series of 6 dives ranged from 30 to 35 seconds. The range for all was 5 to 35 seconds, with an average of 19.

Writing of the Brunswick, Cumberland County, region, Walch (1926: 6) stated that the Harlequin Duck "was last shot by the late Mr. David Scribner of Topsham in the fall of 1891 or 1892." Additional facts concerning this occurrence are: five birds were seen by Mr. Scribner and Mr. Lucien White; three were shot but none pre-

served; and the locality was off Pleasant Point at Merrymeeting Bay. This is the only inland record for this species.

In describing the manner in which these birds were seen to dive, Norton (1896: 231) wrote: "The Harlequins were attracted to the largest billow, one which surged high and sharp, and broke about fifty yards from the reef where its force was spent. For considerable intervals the ducks would sit facing the wind, but not advancing, slightly removed from the fury of the breaker. Then drawing nearer to it they would dive to feed. Frequently all would be under at once, but this diving seemed to depend slightly on the action of the sea, as a portion of the flock, apparently not ready to dive on being threatened by a breaker, would plunge into it, only to rise after some time had elapsed. After a few plunges they would rest . . . Now they were in little groups scattered parallel with the length of the wave, awaiting the rushing flood. . . As it rushed over the inequalities of the bottom its crest began breaking at corresponding intervals. High above them it topped, and as its crest broke in white foam, the little ducks plunged headlong into its front, almost instantly reappearing in its train."

Rackliff observed (*in* Norton, ibid. 233) that these ducks "were very playful in their actions, frequently flying in to a chosen resort to drop into the water and, without a decided stop, resume their flight to another quarter; or they would fly in and dive from the air, reappearing on the wing and away again."

Later unpublished notes on behavior, made by Norton, March 24 to 28, 1938, at Big Spoon Island and Isle au Haut, are given, in part, in the following paragraphs.

"At Big Spoon Island, one group of three, two of them females, allowed me to walk toward them in plain view, and were reluctant to fly; when they did fly, it was only to round the point close at hand and join a flock there. Their combined number was 16—the largest gathering seen by us. With their short, thick, necks, these little birds are chunky in appearance. In flight the head and body are carried on a nearly level plane, the entire flock usually moving in a compact formation, at a low elevation above the water, their short wings beating rapidly. When diving outside of the breakers, they spring just clear of the water and go down perpendicularly. One bird dives, soon to be followed by others, the whole flock being under together. They appear to go nearly straight down and up again, emerging at the same spot whence they submerged.

"At Isle au Haut a flock would move in through a breaker and play in the swirling water close to shore, riding like bubbles on the agitated surface, now being washed over some submerged rock, dabbing here and there as they went, among the swarms of swimming crustaceans.

Now and again, when two breakers would come in close together and stand at a level for a number of seconds, the Harlequins would seize these occasions to dive very close to the rocks, remaining submerged for the short space of 10 to 12 seconds.

"Hordes of Amphipods (*Gammarus* and *Gammarellus*) and Isopods (*Idothea*) swarmed in the turbulent water, dashing into crannies and among seaweeds with the outwash, to await the next onrush of water to swim forth again. These were easy prey for the Harlequins.

"After coming to the surface, the birds would often rise on end and flap their short wings vigorously. The long, pointed, tails were usually carried raised at a low angle above the axis of their bodies.

"The full-plumaged males seemed to keep close together in the flock, though they by no means dominated its movements; one or two females took the lead in any new venture, while the rest followed. In one flock, swimming outside the breakers, a male would raise the forward part of the wings to a level with the back, holding the tips close to the sides of the body and, in a diving position, lower the head to the surface of the water and rush at a female. She, without moving her wings, and with the forward part of her body slightly raised above the surface of the water, rushed rapidly forward, keeping away from the male. These chases were brief.

"On two occasions we saw several standing on the rocks above reach of ordinary waves. They stood and preened, or, those on the higher part of the rock, on finishing their toilet, laid down on their bellies. One group of six was observed thus for some time. Two were full-plumaged males, which remained at the lower part of the rock, just above the surging water. They suddenly saw a lone female, swimming toward the rock. Both males flew out, alighting just before they reached her, but heading in a direction to cross her wake diagonally, when they turned on the water and, raising their wings in the manner previously described, rushed after her. She rushed ahead in the usual fashion, and all reached the rock on the top of a wave, where they brought their feet into action, ran nimbly up beyond the water, and all began preening.

"While watching a flock playing in the breakers near us, we heard a conversational note, *que-que-que*, very much like the peep of young domestic ducks. The Harlequins locally were called 'squeakers'—a voice name. The birds resorted with much regularity to particular chasms in the surf-washed shores; these chasms being locally called 'guzzles,' from the guzzling sound of water surging in and out of them. Squeaker Guzzle is a geographical name at several points among the outer islands and Isle au Haut has its Squeaker Cove on its southern shoreline."

Mention of occurrence at Portland in August (*in* Brownson, 1909: 81) is an error (Norton).

Audubon (1835: 612) reported the Harlequin breeding on the "Seal, White Head and Grand Manan Islands" at the mouth of the Bay of Fundy. After visiting Grand Manan in 1850 and finding none of these ducks there, T. M. Brewer (1852: 298–299) stated that Audubon was in error, probably having confused this species with the Red-breasted Merganser. In writing of the same area, Boardman (1862: 130), who was familiar with Audubon's writings, stated that a "few apparently somewhat disabled individuals breed on the islands." Considering Hardy's observation on the number of mended bones in this species, it is easy to assume that, particularly after rough winters, some disabled individuals were unable to make the northward flight and so remained south of the usual breeding range. On the assumption that this could have been the case, occurrence of birds in summer would have been very irregular because of the uneven weather conditions in winter on the coast, and increasingly less in numbers as the species as a whole decreased. So the fact that Brewer found no Harlequins at Grand Manan did not indicate necessarily that Audubon had not found them 17 years earlier. The argument is strengthened also by the following points: the type of localities where Audubon reported the presence of this duck and his description of nesting sites are in fairly close accord with the known nesting habits of this bird elsewhere; and, it is highly improbable that Audubon would have mistaken this bird for so different a duck as the Red-breasted Merganser. At this late date, however, when the species is so much scarcer than formerly, the matter cannot be settled conclusively.

Labrador Duck

Camptorhynchus labradorius (Gmelin)

No certain record of this bird, extinct since about 1878, but there can be no reasonable doubt that it formerly visited our coast.

Audubon (1838: 271) wrote that this duck was found "along the coasts of Nova Scotia, Maine and Massachusetts, during the most severe cold of winter."

In the *Proceedings* of the Boston Society of Natural History (1859, vol. 6, p. 359) mention is made, under accessions for February 3, 1858, of a Labrador Duck from Caleb Loring, Jr. Although Loring did almost all of his shooting at Scarborough, he did hunt elsewhere rarely, and so this is not an absolutely certain Maine record.

Remarks. Apparently the above mentioned specimen was lost from sight and, years later, a young male having no label was found in the collection and described by W. S. Brooks (1912), without mention of Loring. C. W. Johnson (1913: 2), however, wrote: "The Society is further indebted to Mr. W. S. Brooks for his work on the storage collection of skins. In the course of rearranging and identifying these, he found a Labrador Duck, the 44th known specimen, and probably the one given by Caleb Loring in 1858."

In his early list, Boardman (1862: 130) gave occurrence of this species as "Winter. Rare" at the mouth of the Bay of Fundy, and later (1903: 313) wrote: "Grand Manan; very rare, none of late." A male and female formerly were in the Boardman collection, as listed by Rowley (1877: 223). The female, an adult, was alleged to have been taken in 1862, at Swampscott, Massachusetts (Dutcher, 1894: 8), and the male was listed as "nearly adult," and shot at Grand Manan (J. C. Phillips, 1926: 61). These two specimens were sold to Charles B. Cory about 1880, and Cory's collection was sold, in 1894, to the Chicago Museum of Natural History, where they now are kept.

A female was shot by Simeon F. Cheney, early in 1871, in the Grand Manan archipelago, but subsequently it was lost by a New York taxidermist (Dutcher, 1894: 6–7). The species probably became extinct less than a decade after this date.

J. A. Allen (1886: 232) cited T. M. Brewer (1877a: 46), who wrote that this duck had been abundant in the Boston market in the winter of 1836–37. In William Brewster's copy of Allen's paper, now in the Museum of Comparative Zoölogy library, is this marginal note in Brewster's handwriting: "The accuracy of this statement denied most emphatically by Dr. S. Cabot just before his death." Samuel Cabot was an active ornithologist in Boston at the time of the alleged abundance. This merely places an accent on the obscurity which surrounds this extinct bird.

Steller's Eider

Polysticta stelleri (Pallas)

One record. An adult male, shot on December 3, 1926, at Scarborough, by Nicholas Davis, was secured by Dr. H. H. Brock; it was with two or three Oldsquaws (Norton). The mounted specimen is now in the Brock collection at the Portland Society of Natural History, where I examined it in 1947.

Northern Eider

Somateria mollissima borealis (Brehm)

Winter resident, status not well known but at least occasional on salt water (probably numerous in eastern areas).

Migrations. The earliest fall record is for a male shot on October 19, 1908, at Black Horse Ledge, near Isle au Haut (Jenney, 1908). The latest spring record is for a bird shot on April 6, 1903, in Casco Bay (Lord *in* Knight, 1908b: 107).

Winter. Specimens are known from Cape Elizabeth, Penobscot and Jericho Bays, and Gouldsboro, Hancock County.

Ecology. The known specimens have been taken with the American Eider.

Remarks. When first recording this eider for Maine, Brewster (1885b) wrote that its occurrence from Penobscot Bay eastward was "far from rare or accidental."

For the vicinity of Kent's Island, some six miles southeast of Grand Manan, New Brunswick, Gross (1938a: 388) wrote: "During the winter months great rafts of Eider Ducks, sometimes comprising thousands of individuals, frequent the waters off the southern end of Kent's Island but the birds at this season of the year, for the greater part, are the Northern Eider." And further (ibid. 399): "The winter population of Kent's Island arrives in the latter part of October and by the middle of November is represented by thousands of individuals. At this time they are to be seen in great rafts off the southern end of the island. The winter birds killed by local gunners have proved to be Northern Eider."

American Eider

Somateria mollissima dresseri Sharpe

Summer resident, a common to numerous nester on islands eastward from western Penobscot Bay (several records for Muscongus and one for Casco Bay), the drakes and immature birds abundant westward into Muscongus Bay, numerous to Seguin, and occasional farther westward; *transient*, abundant in spring and fall on marine waters; *winter resident*, numerous to abundant at sea and about many islands. Some may be resident (locally migrant). Four records for occurrence a short distance inland.

Spring. In March the flocks begin to move eastward along the coast, the movement continuing until late in April. An adult male was seen on May 8, 1897, at Scarborough (Norton), and inland, two drakes were seen on May 19, 1943, just above the Bangor-Brewer dam on the

Penobscot, and a drake and four ducks just below the dam on the 25th (Weston).

Fall. The birds start moving westward in October (a few in very late September), their numbers increasing until late November when migration usually ceases.

Breeding and summer. This polygamous species tends to nest in colonies. The duck makes a hollow in the ground out in the open or in a sheltered spot such as under a ledge or fallen tree, at the base of a standing tree, in a conifer thicket, or in a tangle of raspberry bushes. Sometimes an old gull nest is used. Grass, seaweed, or other vegetation is placed in the cavity, the lining of down being added during the latter part of laying and during incubation. Although much higher numbers have been reported elsewhere, in Maine four to six eggs are laid, usually from late April to early June. Incubation takes 28 days, during which the duck leaves the nest infrequently and for short periods only. The many known Maine hatching dates range from June 3 to July 5, with most from June 7 to 16. Ducklings, able to dive readily when very young, are rather independent of the parent, and tend to associate with any female eider, so that up to 12 or 15 young of varying ages may be seen in the company of one duck. The fledging period is unknown. One brood is raised yearly.

After the nesting site is selected, the drake takes no part in nesting activities or rearing of the young. When nesting singly, or with only a few pairs, the drake may remain in the general vicinity. (Breeding data summarized from Gross, 1938a, 1944b, with numerous additions.)

For the past ten years, Cruickshank has noted flocks of eiders in Muscongus Bay all summer. Sometimes these total a thousand birds, as in June, 1942. Most of the birds are drakes, many of them probably mates of the ducks nesting in Penobscot and Jericho Bay colonies. Since 1940, various observers have reported seeing flocks, sometimes containing as many as 200 birds, summering as far westward as Sequin. These probably consist mainly of immature birds.

Winter. The center of abundance of wintering birds is from Damariscove Island off Boothbay Harbor, Lincoln County, east to Petit Manan Point in Washington County. Probably over 80,000 winter in this section, with a combined total of about 20,000 for east and west of these points. There is much shifting about of flocks throughout this season. The winter habits and abundance of this species have been little known by ornithologists, who have generally regarded these ducks as less numerous than they actually are.

Ecology. For nesting, these birds seek islands, either wooded or treeless, which are uninhabited by man. Norton (1923a: 17–19) described the daily flights, of wintering birds, in from sea, where they pass the

night, to feeding places (mussel beds), showing that the distance traveled sometimes may be as much as nine miles.

"In feeding they congregate on a lee shore, where they drift off after having fed sufficiently, preening, bathing, and drifting until impelled to feed again. Then they swim up to the diving place, in 10 to 30 feet of water just beyond the breakers, while others are at the same time drifting away, so that the flock revolves over the diving place in an endless chain. When darkness begins to close in, those able to fly proceed to wing their way far out over the open sea while those too heavily gorged to fly swim after the flying flocks" (Norton, notes).

This duck nests in rather close association with Leach's Petrel and with two of its predators, the Herring and the Black-backed Gull. It is markedly gregarious and social at other seasons, its flocks often joined by Northern and King Eiders, scoters, and even mergansers and loons.

Remarks. Formerly, the American Eider fed along the entire surf line of the mainland and even up the mouth of the Kennebec River for about five miles to Weasel Rocks. The breeding range in the 1830's and 1840's extended westward to the Egg Rocks and Shark Rock in Muscongus Bay. The birds and their eggs were in too great demand, however, for such a situation to continue. With drakes weighing six pounds, and ducks five, almost always in good flesh, and four to five birds yielding a pound of feathers, this eider was prized by gunners over any other seafowl. Their eggs also were preferred for the table. Widespread use of the percussion-cap gun, after the Civil War, drove the eider to less accessible islands and ledges. With the rise of winter lobstering about 1880, the species was driven farther out to the more distant shoals and ledges. Nearly all the fishing boats carried guns and, when a flock was found 'bedded' at a ledge, a single morning devoted to shooting was a profitable day's work for the men aboard. A hundred birds was not an exceptional bag for two gunners in a morning.

By 1904, the breeding population had reached its lowest point. Perhaps only four adults, at Old Man Island, off Cutler in Washington County, and a few elsewhere were known of in the state (Norton *in* Dutcher, 1905a: 92). In 1905, the National Audubon Society leased Old Man Island (Norton, 1905c: 78), and in 1907, Norton (1907d: 326) saw seven ducks and one young drake there, with three adult drakes not far away. As for the wintering population at this time, the coming of the relatively fast motor boat and the great increase in numbers of fishermen forced the birds to yield further their haunts and resort to the outermost shoals, feeding in three to five fathoms of water.

Although given widespread protection the year round for a period of years later, recovery of the breeding population was not rapid. In 1921,

Norton (1921: 356) wrote that the western movement of the Herring Gull had given "confidence and encouragement to the Eider Duck to linger at long-abandoned places formerly occupied by these two species." The wintering population began reoccupying the outer ledges and, gradually, many of the inner ones within the larger bays, so that by 1924, they were again 'bedding' in numbers in such waters as Casco and Saco Bays. In the summer of 1931, Norton and Allen (1931: 591) found 25 broods and 27 nests along the eastern coast, and by 1943, Gross (1944b: 17–18) had found nests on 31 islands and estimated that the nesting population probably exceeded 2,000 pairs. Localities included offshore No Mans Land in the Matinicus group, and Mark Island in Casco Bay where a nest with four eggs was found on June 14, 1943. For number of individuals occurring per year, the American Eider is now third duck in abundance in the state, perhaps being nearly as numerous as the Oldsquaw.

The Muscongus Bay record is for a female and two young seen on August 7, 1946, on Franklin Island (Cruickshank). Inland records (besides those under Spring) are for three birds shot on unknown date in the fall of 1918 at Merrymeeting Bay, one of which was seen in the flesh by Spinney, and a drake seen on April 17, 1944, just below the Bangor-Brewer dam (Weston).

On August 23, 1936, Norton timed eight submergences in unknown depth of water at Kent's Island, New Brunswick, finding a range of 10 to 30 seconds, with an average of 19.

Although the first unquestionable Maine record for this duck is by Wilson (1814: 122), who reported it breeding, probably the great ducks mentioned by Rosier (1605) referred to this species.

When reading Knight's various writings on this bird, one should allow for the fact that he usually made no distinction between Jericho and Penobscot Bays, referring to both under the latter name.

King Eider

Somateria spectabilis (Linnaeus)

Winter resident, uncommon but probably regular on salt water; two *summer* records. Rare inland.

Migrations. Fall records are usually for November, with these two exceptions: a duck and two young drakes shot between October 10 and 14, 1941, at Baileys Island in western Casco Bay (E. Sinnett), and a duck shot there by Sinnett on October 22, 1909, which is now in the collection of the Portland Society of Natural History. The latest spring

records are: a young male and female shot on April 20, 1894, near Vinalhaven, Knox County (H. A. Arey); one shot on April 20, 1902, at Baileys Island (J. Lord); an immature duck shot on April 20, 1909, in Casco Bay (Norton); an immature bird shot on May 1, 1898, at Seguin Ledges (Spinney); and an occurrence on May 29 of unstated year and place (G. M. Allen, 1909: 44).

Flight year. In the winter of *1875–76*, a "good many," none fully adult, were brought to Cumberland County taxidermists (N. C. Brown).

Winter. This species has been noted at points along the coast west to the edge of York County.

Summer. A young drake and three ducks were seen (the drake shot) on June 13, 1918, and a single female seen the next day, some 70 miles inland at Duck Lake, Lakeville, Penobscot County (Kennard, 1923). On June 15, 1938, three drakes were observed carefully near Shark Rock in Muscongus Bay (Cruickshank and others).

Ecology. This species sometimes feeds in deeper water than the American Eider, as mentioned by Norton (1900: 18) for the vicinity of Big Green Island, Knox County. It also appears in such unexpected places as along sheltered shores, in creek mouths, and even inland. Occasionally, small groups are found to be composed of King Eiders only, but usually this bird associates with American Eiders. There is one record of a single bird associating with a mixed flock of scoters in Casco Bay.

Remarks. Inland records, besides the Duck Lake one cited above, are: a duck shot on November 15, 1926, at Merrymeeting Bay (Norton); and another shot in the fall, about 1936, at Holbrook's Pond in Eddington, Penobscot County (Mrs. F. H. Eckstorm).

Three birds shot in April, 1899, at Big Green Island, had eaten young holothurians (*Pentacta frondosa*) (Norton, 1900: 18). "A King Eider, shot at Scarborough, during the winter of 1907–08, had its gullet filled with large specimens of *Gammarus locusta*, the common sea flea of our shores. Another taken in 1908 was similarly filled with young crabs (*Cancer irroratus*), in both instances to the exclusion of other food" (Norton, 1909f: 439). Knight (1908b: 111) reported finding mussels the chief food item of the few birds he examined.

Legendary, and undoubtedly erroneous, reference to breeding along the New England coast was made by Audubon (1835: 523). W. S. Brooks (1913: 108), citing Norton, was not entirely correct in stating that this bird "feeds largely" on holothurians, since Norton had only one record of three birds doing this, as stated above.

Eastern White-winged Scoter

Melanitta fusca deglandi (Bonaparte)

Transient, abundant in late fall and spring coastwise, and uncommon but regular in late spring, with more numbers in fall, on large bodies of water inland; *winter resident*, common to numerous on salt water; *non-breeding summer resident*, common on salt water and rare inland. May have bred formerly.

Spring. Beginning about April 6, large numbers gather at favorite feeding places, and the population increases until about May 20. On April 16, 1923, thousands were gathered in Jericho Bay (Norton). Most birds depart the last ten days in May, the majority of the flocks going inland before reaching Washington County waters. A few birds stop briefly at inland points in the state. Migration ends about June 7.

Fall. Most migrants are noted from September through October, adult birds arriving first, and, generally after October 14, the young of the year. Migration in the interior, to the coast, continues into early November. Generally speaking, this scoter is the earliest of the three to arrive on salt water in numbers.

Summer. The summering flocks of scoters on salt water are mostly of this species and probably consist mainly of first-year birds. The records for inland lakes at this season are for single birds or very small numbers.

Winter. Flocks, of usually less than 40 birds, occur regularly at suitable feeding places all along the coast.

Ecology. This bird is not quite as marine as the eiders. The flocks move shoreward to feed by day. They feed in moderate depths of water, about 8 to 20 feet, chiefly on mussels, but also such shellfish as quahogs, periwinkles, and small crabs (Norton). Common associates are other scoters, and occasionally eiders are seen with them.

Remarks. From about 1860 to 1916, this species declined steadily from over-shooting, but in recent decades apparently has recovered considerably in numbers. All the scoters are somewhat unwary, the present species being the least shy and noisy of the three. Gunners often kill large numbers in a morning's shooting over decoys. The account of hunting by Spinney (1897), reprinted in Knight (1908b: 113–117), is a valuable contribution to the literature on these birds.

A drake, shot on May 9, 1888, near Portland, was white except for gray markings on head, neck, and upper tail coverts (Webster, 1888).

Audubon (1835: 356) wrote that this duck bred on Grand Manan, New Brunswick, and rarely farther south. In 1929, E. B. Sawyer of Jonesport wrote Norton that, from "a reliable source," he had learned of a 'White-winged Coot' raising its young in 1928 at The Brothers Islands, off Roque Bluffs, Washington County.

Surf Scoter

Melanitta perspicillata (Linnaeus)

Transient, common to numerous in late spring and more numerous in fall on salt water and at Merrymeeting Bay, and uncommon inland; *winter resident,* uncommon on salt water; *non-breeding summer resident,* uncommon on salt water. One possible breeding record.

Spring. Transients first appear in numbers about April 15 to 18, over a week later than the White-winged Scoters. Departure is in the latter half of May, the flocks going overland, with a few birds lingering until the first week in June.

Fall. Whereas there are records of transients for as early as September 15, most birds arrive from October 5 to 30 and depart by November 12. The peak of the flight is later than that of the preceding species.

Summer. Small numbers, usually two or three identified, occur in mixed flocks of summering scoters. Norton's notes contain mention of several "sizeable flocks" in July and August, but not for recent years. Throughout June, 1941, however, over 100 of these scoters were seen in Muscongus Bay (Cruickshank). On June 25, 1896, two birds were seen at offshore Seal Island in the Matinicus group, and Norton secured one of these for his collection.

Winter. As in summer, this bird occurs in mixed flocks of scoters. Twenty or 30 is a fair-sized number to see at any one place, and twice as many is unusual. Over 100 were seen in January, 1945, in Casco Bay (C. Packard).

Ecology. This species is found in the same places as the White-winged Scoter, with which it associates.

Remarks. From incomplete data at hand, it appears that this bird once was nearly as abundant as the White-winged Scoter. Now it is relatively scarce. Grouping together the spring and fall transients, the ratio in numbers of the three species is, perhaps: 100 or more White-winged Scoters to 20 American to 10 or less Surf Scoters.

A partial albino, having black eyes, was shot on October 13, 1884, at Boon Island, York County (Merriam, 1885). Rackliff shot two partial albinos in Knox County about 1893 (Norton).

Norton timed three submergences in unstated depth of water at Pine Point, Scarborough, in October, and found them to be 21, 26, and 27 seconds.

American Common Scoter

Oidemia nigra americana (Swainson)

Transient, numerous to abundant in spring and fall on salt water, and common to numerous in fall on larger bodies of inland waters;

winter resident, uncommon but regular on salt water; *non-breeding summer resident*, uncommon but regular on salt water.

Spring. This is the earliest of the scoters to arrive, numbers sometimes appearing by very early April and the peak of the flight preceding that of the White-winged Scoter. Most have departed by May 12, with some flocks of transients lingering until the end of the month, though rarely after May 24. This scoter is "never seen in the spring at Merrymeeting Bay" (Walch, 1926: 14).

Fall. Some migrants are noted as early as the first week in September. The peak of the flight occurs in early October, and arrivals continue until the middle of November. In proportion to its numbers, more stop on fresh water at this season than White-winged Scoters. At Lake Umbagog, sizeable flocks have been seen, chiefly in October, as discussed at length by Brewster (1924: 169–180), and at Lake Auburn, Androscoggin County, a flock of about 100 was seen on October 15, 1899 (E. Johnson, 1900a: 9).

Summer. A few birds of this species often are found in summering flocks of White-winged Scoters. It is unusual to see over 30 at one place, but Cruickshank saw over 100 throughout June, 1941, in Muscongus Bay.

Winter. The wintering population is about the same in numbers as the summering one.

Ecology. This bird is found in the same places as the White-winged Scoter, with which it and the Surf Scoter associate, especially in summer and winter.

Remarks. Comparative numbers have been discussed under the preceding species. Data indicate that this species never was as numerous in Maine, in the last 100 years, as the White-winged Scoter.

"Along the coast they obtain their living by diving, feeding on mussels, clams and other mollusks; inland on the ponds they likewise prefer *Unios*" (Knight, 1908b: 111–112).

At Umbagog this bird is called the Sleigh-bell Duck, from its musical note (Brewster, 1924: 171). This melodious whistling, which is not peculiar to this species of scoter, is a characteristic sound heard above the noise of the surf along our bleak winter shores.

In their Mt. Desert Island list, Tyson and Bond (1941: 55) wrote that this species was "said to have once nested on Green Nubble (Gott)." Bond recently (1947) wrote me that he considers this report unreliable.

Northern Ruddy Duck

Oxyura jamaicensis rubida (Wilson)

Transient, one recent spring record and regularly uncommon in fall on fresh, brackish, and salt water; *non-breeding summer resident*, rare on fresh water.

Spring. Although Knight (1908b: 118) gave April and May as the time for spring migration in Maine, the only recent record is for a bird seen by Weston on March 27, 1942, at Cambridge, Somerset County.

Fall. Most records are for early October to about November 10. The two earliest are for a bird shot on August 25, 1919, at Merrymeeting Bay (Walch, 1926: 14), and a flock of six (one shot) on September 12, 1929, on the Androscoggin River above Brunswick, Cumberland County (Palmer). The latest record is for a bird captured on November 15 of unstated year (Norton).

Flight years. On October 12, *1905*, "large numbers" arrived at Merrymeeting Bay, "hundreds" being shot (Noble, 1905d: 65). They were more numerous than usual in autumn in *1942* and *1944* at Merrymeeting Bay, two flocks totaling about 60 birds being seen on October 26 of the latter year (Mendall).

Summer. In 1941 and 1942, Mendall saw several birds each summer on the Penobscot River, and at Pemadumcook Lake in Piscataquis County. A female was observed August 9 to 16, 1947, at Jackman, Somerset County, and photographed at close range (W. Foerster).

Ecology. This duck occurs on fresh or brackish water, usually where there is much submerged vegetation, and less often on salt water. Ordinarily it does not associate with other ducks.

Remarks. Until about 1896, this duck was a common fall transient throughout the interior, but rather rare in spring. By 1918, it had decreased considerably, and, by the early 1920's, had reached the present low level. There has been no sign of recovery. Walch (1926: 14) was writing of past history when he reported the species common at Merrymeeting Bay for 30 days in fall.

Records of the largest bags in the present century, except for the flight year of 1905, are for 11 shot in the fall of 1902 in Cumberland County by Rogers, and 15 shot, all on October 15, 1909, by members of the Great Pond Club at Cape Elizabeth (Norton).

Boardman (1862: 130) gave the status of this duck in the Calais region as "Winter. Rare." Whereas this has been quoted widely by later authors, the fact that Boardman omitted mention of winter occurrence in later writings indicates that it was an error.

Hooded Merganser

Lophodytes cucullatus (Linnaeus)

Summer resident, rather common in unsettled parts of Oxford, Franklin, Somerset, Piscataquis, Aroostook, Penobscot, and Washington Counties, and perhaps in northern Hancock where it is seen occasionally; *transient,* common to numerous in spring and fall on fresh and very sheltered salt water; three *early winter* records.

Spring. Birds begin arriving on the coast in the latter part of March. Earliest records are for a bird seen on March 21, 1894, and a female shot on March 22, 1901, near Portland (Norton). They leave for inland points as soon as there is open water, most birds departing by April 17, with stragglers to May 7. The earliest arrival date at Presque Isle is April 11, 1941 (Chamberlain). An unusual occurrence was that of two flocks seen on the late date of May 21, 1876, at Scarborough (Smith).

Fall. Most migrants are seen from October 10 to November 17. An early salt water record is for a pair shot by Pillsbury on September 16, 1925, at Scarborough. The last birds to leave fresh water are driven out by ice.

Breeding and summer. This merganser nests in holes, at varying heights, in trees and stubs near or standing in water. The cavity is lined with down. Five to eight eggs are normal, with up to 18 recorded (? laid by two females), and probably are laid throughout May and into early June. Brewster's earliest "full clutch" at Umbagog was taken on May 25 of unstated year (J. C. Phillips, 1926: 251). Outside of Maine, incubation has been given as 31 days (W. Evans *in* Forbush, 1925: 188), but probably is less than that. Although Brewster (1924: 87) saw a female with six small young on June 11, 1880, young usually are not seen until the latter half of that month. The manner in which the young leave the nest is not understood fully, and the fledging period apparently is unrecorded. One brood is raised yearly.

Weston has seen this species in summer in central Hancock County.

Winter. There are three early records as follows: one seen on December 8, 1902, in the Presumpscott River at Windham, Cumberland County (Norton); six seen on December 21, 1938, in the Wiscasset region, Lincoln County (D., L., and J. Washington, 1939); and three seen on December 22, 1937, in the same region (D. and L. Washington, 1938).

Ecology. In spring the females seek hollow trees near inland streams, ponds, and lakes. Undoubtedly the distribution of the nesting population is influenced greatly by availability of sites, these also being sought by Goldeneyes and Wood Ducks. On salt water and the larger

bodies of fresh water, these mergansers resort to the most sheltered areas of coves and the like. Usually they do not associate with other wildfowl.

Remarks. In the 1870's and earlier, this species was a common to numerous breeder inland, and abundant in migrations. Brewster, who visited Umbagog from 1871 to 1909, gave a graphic picture (1924: 83–84) of the great decrease in that region. Chiefly because of shooting, numbers had declined greatly by the late 1880's, and thereafter, from shooting and, he surmised, "other and more obscure causes," the decrease continued until the bird was "well-nigh locally extinct" by the time his visits to the area ceased. This decline was paralleled roughly throughout the state in the same period. The low point was reached some time in the decade of 1910–1920. After the early 1920's a very slow increase began, and even though this has accelerated noticeably since the middle 1930's, the birds have recovered only a fraction of their former numbers. In the case of the nesting population, this increase appears to be more local than general.

Brewster (ibid. 89–90) reported flushing two females, one right after the other, out of a tree cavity at Umbagog; he also pointed out that females consort together in the breeding season and probably lay in each other's nests. Because of the competition for nesting sites between this species and the American Goldeneye and Wood Duck, mixed sets of eggs are found occasionally, with the Hooded Merganser-American Goldeneye combination more common (also see reference, under American Goldeneye, for a hybrid between these two birds).

Brewster (ibid. 85–86) found no evidence of the Hooded Merganser eating fish at Umbagog. He saw them pulling up, and apparently devouring, the roots and stems of various water plants, and found vegetation in the stomachs of the birds he examined. Aquatic insects also were found. Most of the food obtained apparently was secured in water less than six feet deep.

American Merganser

Mergus merganser americanus Cassin

Resident (locally migrant), breeding occasionally in settled areas and rather commonly in unsettled areas from northern Cumberland County throughout, and in winter, common to numerous (locally) on open rapids in streams and rivers and rather uncommon on fairly sheltered salt water; *transient,* common to numerous in spring and fall throughout.

Spring. Migrants are noted from about March 14 to April 22, the birds arriving at the larger bodies of water as soon as these are partly

cleared of ice. For exposed salt water about islands several miles from the mainland, there are more spring records, single birds or pairs, than for any other season. Chamberlain's earliest arrival date for Presque Isle is March 18.

Fall. Migration begins about October 10 and continues through November, the last birds being forced to move by ice. The peak of the flight occurs early in November, being later than that of the Red-breasted Merganser.

Breeding. This species nests in cavities, at any height, in trees near water, and occasionally in holes in banks or piles of rocks or boulders, and the same site is used year after year. A female, apparently searching for a nesting site, came down a chimney into a cabin at Jackman, Somerset County, in June, 1944 (Mrs. W. Foerster). The nest is lined with down. Eight to 12 eggs are usual, but up to 19 (? laid by two birds) are reported. In Maine, first clutches are completed from May 12 to 25. Actual dates are: 11 eggs with small embryos, May 19, 1881, at Richardson Lake, Franklin County (Brewster, 1924: 78–79); nine eggs in late May, 1899, on Songo River, a tributary of Sebago Lake, Cumberland County (F. Shaw); and 10 "nearly fresh" eggs on June 19, 1881, at Moosehead Lake (Sage, 1881: 51). Outside the state, incubation is reported variably as requiring 32 to 35 days. The drake leaves the duck when incubation begins. The young may remain in the nest two or three days, then, on signal from the duck, climb to the entrance and drop to the ground. Many young broods in August indicate that a second clutch is laid if the first is destroyed. To find unfledged young in mid-September is a common event. The fledging period is unknown. One brood is raised yearly.

Winter. Usually a few birds are found on salt water, and flocks of varying size are found on rapids in any sizeable stream where they are not molested. At the Bangor Salmon Pool, on the Penobscot, the number varies from year to year from about 40 to 200 birds in February. In the winter of 1938–39, they were very scarce there, undoubtedly because the Pool was nearly covered with ice for about ten days in December (Mendall).

Ecology. In late spring the females seek hollow trees and cavities in the ground for nesting sites, the availability of these being a major factor in the distribution of breeding birds. This species fishes by day, in shallow water to about 12 feet in depth, and usually is seen close to shore or the edge of ice, depending on the season. It is equally adept in calm water, rapid currents, and eddies. Several birds fish together, leaping partly out of the water to begin the plunge downward, and often swimming rapidly for many yards before emerging. Seldom are more than a dozen seen together, except during the fall migration or

when numbers are forced to concentrate at restricted feeding places in winter. When not feeding, they often perch on ice or rocks and preen. On the Allagash River, in the summer of 1941, they seemed to have favorite perching rocks in the stream, for these were well whitewashed by their droppings.

This bird associates regularly with the Red-breasted Merganser and occasionally in winter with the American Goldeneye.

Remarks. This sheldrake formerly was "one of the most abundant summer residents" in the lakes of northern Maine, as stated by Samuels (1867: 528). Sage (1881: 51) reported it to be the most common of the Anatidae at Moosehead Lake in the early summer of 1881. There was a decline in numbers during the next four or five decades. At present, having increased for perhaps the last decade, there is a fairly sizeable population, but the species is decidedly less plentiful than it was 60 or 80 years ago.

In other parts of its range, this bird is known to eat trout and salmon eggs. For Maine, Knight (1908b: 78) wrote: "The adult birds feed on fish exclusively while inland as far as I have been able to ascertain, preferably on the various species of so called minnows and chubs, though by no means disdaining salmon fry and trout when these are obtainable. Along the coast in winter they eat many mussels and allied species of mollusks, swallowing them shell and all. The shells are soon ground to pieces in their intestines and stomachs, and in dead birds dissected out I have traced the entire process from entire mussel shells down to impalpable mud at the lower end of the intestinal tract." Of these mergansers at Umbagog, Brewster (1924: 69) wrote: "Most of the local gunners slay it ruthlessly, whenever opportunity offers, believing it to be a wholesale destroyer of Trout and young Salmon. . . According to my observation it preys almost exclusively on Pickerel and Minnows in the Lake; on Chub, Dace, and Minnows in swift-flowing streams. What if it does take a few fishes valuable for human food? Most of these are cannibals and among the worst enemies of their own kind, the larger devouring the smaller in countless numbers."

On February 19, 1940, Norton timed six submergences by two females in three to four feet of water at Back Cove, Portland, finding a range of 12 to 22½ seconds with an average of 18.

At the Bangor Salmon Pool, Weston saw a partially albinistic female, having a very light reddish crest, light buff primaries and secondaries, and the rest of the plumage a dirty white. He saw it there from February 13 to March 23, 1944, and presumably the same bird again from February 13 to March 10, 1946.

When flushed, these birds often defecate before taking wing, and on

several such occasions, I have noted many tapeworms in the fecal matter. Brewster (1924: 77) told of a gunner shooting one of these birds, on the Androscoggin River, that vomited up a live pickerel. This suggested to Brewster the possibility that, since "the Goosander habitually carries fishes of various kinds in its gullet, it must fly with them rather frequently over dams, falls, and stretches of dry land, and may occasionally drop them, while still alive and essentially uninjured, in waters untenanted by their kind."

Williamson (1832: 148) gave "*Water Raven*" as a vernacular generic name for the two large sheldrakes in Maine. Mention by Josselyn (1674; 1865b: 80) of "a great black and white *Duck*," that frequented rivers and ponds, is the earliest Maine record for the American Merganser.

Red-breasted Merganser

Mergus serrator Linnaeus

Resident (locally migrant), breeding rather commonly on islands westward into Penobscot Bay, uncommonly from there into Casco, and occasionally at secluded lakes and larger ponds island, with a few non-breeders seen along the coast, and in winter, very common chiefly on salt water; *transient*, numerous in spring and abundant in fall on salt water and rather common in spring and rather numerous in fall inland.

Spring. Migration extends from March 21 to May 24, most birds arriving on salt water the first ten days in April. The later flocks appear to be composed largely of females.

Fall. Migration begins the last week in September, is most pronounced the last half of October, and continues to the end of November.

Breeding and summer. The ground nest, sometimes a short distance from water, is placed beneath an overhanging bank, boulders, plants, bushes, or a stump. Some plant material is placed in the cavity and a lining of down added. Although six to 12 eggs are usual, Hardy (1899a) reported finding 16 in one nest at an unstated Maine locality. Clutches probably are completed from May 20 to June 15, which is later than for the American Merganser. Knight (1895a) found ten eggs on June 21, 1894, at Saddleback Ledge, west of Isle au Haut. Outside of Maine, incubation is reported variably as 26 to 30 days, probably being nearer the latter figure. The fledging period appears to be unrecorded. One brood is raised yearly.

Hardy (1899a) wrote: "If their eggs are taken they will lay a second time, and I have good reason to believe even a third time. I have one

mounted which is in the down, which I took August 26, 1888, at Caucomogomoc Lake [Piscataquis County]. There were six in the brood to which this belonged, and I saw another brood of four only a few days old. On speaking of this to a hunter of my acquaintance, and expressing surprise at birds being in the down so late, he said: 'Oh! I can tell you all about that. I was hunting bears up there, and I robbed all the nests there twice to get the eggs to eat, and the broods you saw were a third brood from eggs laid after I left.' As the ice begins to form there the last of September, it seems hardly possible that these birds could . . . [attain flight before the lake] froze."

The non-breeding birds seen along the coast at this season usually are solitary females.

Winter. These mergansers are seen regularly on salt water as far out as the Matinicus Islands, although not reported from there in the sizeable flocks occasionally seen inshore. Unusually large numbers remained along the coast in the winter of 1940–41 (Gross; Weston). On February 18, 1943, Weston saw an estimated 300 birds at the Bangor Salmon Pool on the Penobscot—a large number for that place.

Ecology. Hardy (1899a) reported that, as far as he had observed inland, this species always nested on low, ledgy islands. The same preference, plus some degree of remoteness from woods, holds for the salt water breeding birds. Inland, this bird frequents more open water than the American Merganser, and on salt water, it is far more marine, probably feeding in deeper water. On salt water this species moves away from land in the evening and returns shoreward to feeding places after dawn. When feeding, a flock does not linger about points or ledges but travels along, strung out in a line and moving forward constantly. Of the two large mergansers, the Red-breasted is the least shy; it is also more gregarious and social than the American. The young of the two species often join in flocks in fall. Adults of the present species associate, in migration and winter, with Goldeneyes and even Old-squaws and various scoters.

Remarks. This species is much less numerous than it was 60 or 80 years ago. The breeding population appears not to have changed noticeably in the past decade.

For the 13 years, 1842 to 1854, Rogers shot 120 of these birds at Scarborough; for the 21 years, 1891 to 1912, Pillsbury shot 248 there. Relatively few of the other mergansers are killed at this tidewater locality.

Norton's notes give weights of adult males as 34 to 41 ounces, and of females as 24 to 30; four submergences in water under six feet in depth, near Portland in winter, ranged from 18 to 24 seconds with an average of 20½.

Occurrence of "Sheldrakes" in the Gulf of Maine in summer was mentioned by Capt. John Smith (1616: 47; 1865: 47), which is 58 years earlier than Josselyn's (1674; 1865b: 80) mention of them within Maine's present boundaries.

Family CATHARTIDAE

Eastern Turkey Vulture

Cathartes aura septentrionalis Wied

Rare *visitant,* March 15 to late December, chiefly in coastal counties.

Records. All records are: one taken in the Calais region prior to 1862 (Boardman, 1862: 122); two seen (one taken) about November 1, 1874, in Standish, Cumberland County (N. C. Brown, 1874; Roamer, 1874); one taken about December 31, 1876, at Buxton, York County (N. C. Brown, 1882f: 23); one taken March 15, 1883, at Denmark, Oxford County (Norton, 1911b: 263); one seen [prior to April, 1897] near Bangor by Hardy (Knight, 1897d: 57); two caught in bear traps at unstated localities on unrecorded dates, on authority of Hardy, and one seen August 5, 1904, at Scarborough (Deane, 1905); a female taken on August 27, 1910, at Cape Elizabeth (Norton, 1911b: 263); one taken about August 1, 1916, west of Bingham, Somerset County (Forbush, 1927: 89); one, apparently disabled, seen about 1931, at Bar Harbor, Mt. Desert Island (Tyson and Bond, 1941: 56); an injured bird captured alive on July 3, 1940, at Jackman, Somerset County, and released five days later (Eckstorm); two seen in August, 1940, near Bangor (Tyson and Bond, ibid.); and one seen on April 14, 1944, at Gorham, Cumberland County, and reported to Haven by G. L. Wilson.

Remarks. There was confusion regarding dates and localities for the earlier records, but Norton (1911b) straightened out those that were reasonably definite, and they are given correctly above.

Early mention of "*Turkie Buzzard*" by Josselyn (1672; 1865a: 46) probably referred to young Bald Eagles. He said the bird was as big as a turkey, brown in color, and very good to eat.

Pettingill (1939a: 329) gave two records for nearby Grand Manan, New Brunswick.

Black Vulture

Coragyps atratus (Meyer)

Rare *visitant,* chiefly in early fall in coastal counties.

Records. All records are: two specimens from Calais or vicinity, one [about 1868] (Boardman, 1869c), and the other probably in 1892, on

authority of Boardman (Dutcher, 1893); one taken on September 25, 1897, at Whitefield, Lincoln County (Powers, 1897j); one taken, on unknown date, at Eliot, York County (Knight, 1898c); one captured alive on August 20, 1901, near Dover, Piscataquis County (Dean, 1901; Knight, 1908b: 215); a male shot on August 26, 1904, at Lubec, Washington County (Clark, 1905a); a male shot on July 6, 1909, at offshore Monhegan (Maynard, 1909: 119); one seen on July 11, 1915, at Scarborough (Norton, 1916: 381); one shot at Springfield, Penobscot County, prior to April, 1939 (Bond); and one shot on October 21 or 28, 1941, at Milo, Penobscot County, and examined by Eckstorm.

Remarks. Griscom (1942: 122) mentioned a specimen taken "in Maine" in 1941, which undoubtedly was the bird examined by Eckstorm at Milo.

The early records were discussed by Norton (1916: 381–382); he pointed out, among other things, that Boardman's statement (*in* Dutcher, 1893: 82) of knowing of six occurrences, included Maine and the New Brunswick mainland and islands of Campobello and Grand Manan. Of these, the Campobello specimen was cited erroneously by Knight (1908b: 215) as having been taken at Eastport, Maine.

Norton (1916: 382) stated that Boardman secured a specimen at Calais in 1875, but a check of the original sources shows that they actually refer to the bird taken about 1868.

Family ACCIPITRIDAE

Swallow-tailed Kite

Elanoides forficatus (Linnaeus)

Erroneous report. Grinnell (1883) reported this species as taken in Maine, but quickly (1884) corrected the error.

Eastern Goshawk

Accipiter gentilis atricapillus (Linnaeus)

Resident (locally migrant), regularly uncommon throughout much of the interior of the state, and perhaps also on larger inshore islands. Subject to *incursions.*

Spring. When there is a marked migration or incursion, the northward movement takes place from late March to May 1, as indicated by more records for that period in southwestern coastal areas.

Fall. Southward movements occur from about October 20 (rarely October 1) through November.

Incursions. Unfortunately, incursions of this species have received far less attention and recording than have those of the Snowy Owl. In the following data on Maine incursions, those accredited to Mendall are based on his studies of the records of Walter Clayton, former taxidermist at Lincoln, Penobscot County.

Two large incursions, recorded elsewhere in New England, undoubtedly included Maine in their scope. These were in the winters of *1859–60* in Massachusetts (Howe and Allen, 1901: 62), and *1870–71* in Rhode Island (Deane, 1907a: 183). The following were recorded for Maine: *1896–97*, large (Powers, 1897b; Deane, 1907a: 182); *1905–06*, large (Deane, ibid.); *1906–07*, large (ibid. 182–184; Hardy, 1907; and others); *1908–09*, noticeable (Brownson, 1908c: 120; Clark, 1909b); *1917–18*, large (Norton, and others); *1921–22* and *1925–26* (Mendall), comparative size unrecorded; *1926–27*, largest recorded (Gross, 1928b: 8; and others); and, *1936–37*, noticeable (Norton, and others).

Breeding. The nest, at varying heights in a coniferous or deciduous tree (usually the latter), is composed of sticks and lined with twigs, grass, or bark. Hardy (*in* Bendire, 1892: 197–198) wrote: "There is both an old and new nest of this species on my own land [at Brewer]. The first about 140 yards from a blacksmith's shop. These are the only two I ever heard of having been found in this vicinity. I think they occupied the first nest at least six or eight years, as ten or twelve adults and young were shot in the near vicinity; but so shy were they that no one ever suspected their nesting until the nest was accidentally found. A female was shot from it in 1877, and another in 1878. They then deserted the locality, and I have recently found where they rebuilt. The nesting sites were in both instances in white birches, about 20 feet from the ground. A very small young one was taken from the last nest June 5, 1887. They probably commence laying here about May 1."

Usually three or four eggs make a clutch. For Oxford County, Carpenter (1884a: 9) gave April 25, of unstated year, for a clutch of four. Other dates are: three eggs, slightly incubated, on April 27, 1941, in inland Hancock County (Harris); two eggs, incubated about a week, on April 29, 1938, and three, slightly incubated, on May 3, 1939, at Holden, Penobscot County (Eckstorm). A nest with downy young was found on June 2, 1937, on Mt. Desert Island (Tyson and Bond, 1941: 56), and three young, able to fly but still near the nest, were found on July 15, 1940, at Greenfield, Penobscot County (Weston). The incubation period probably is four weeks, according to Bendire (1892: 198). Fledging probably requires about six weeks. One brood is raised yearly.

Winter. At this season, there is local wandering of the native population.

Ecology. This is a bird of forests, perhaps showing some preference for mixed woods, at least in Maine.

Remarks. Of these birds, Hardy (1907) wrote: "They are both the shyest and boldest of our hawks. It is almost impossible to creep to one when he is on the watch, yet they will dash into a dooryard and kill a hen, caring nothing how many people are close by. I have known one to dash through an open door into a house in pursuit of a hen which took refuge there in trying to escape. As fair examples of their boldness, lately one came right into the middle of our city [Bangor] and took a dove from the sidewalk within a few feet of a house, and another took a hen in a dooryard and allowed himself to be taken in the hands of the woman who owned the hen; he put up a strong fight before he was killed. A few days ago one was brought to me which killed two large Plymouth Rock hens before a gun could be brought. In this, as in many cases, the bird was killing more than he needed just for the sport of killing. I have known one to kill five Ruffed Grouse and tear them in pieces, leaving them uneaten."

Although Hardy may have overstated the 'killing for sport' aspect, it is true that the grouse population suffers heavily during a Goshawk invasion.

Of 139 Goshawk stomachs which contained food, Gross (1928b: 10) found frequency of occurrence as follows: poultry, 82; Ruffed Grouse, 25; Cottontail, 19; Red Squirrel, 8; and Pheasant, 3. He also found smaller quantities of 11 other bird and mammal items. Although it was not stated in his report, almost all the stomachs examined by Gross were obtained from Connecticut. Mendall (1944: 199) listed frequency of occurrence in 31 stomachs as follows: poultry, 14; Red Squirrel, 7; Ruffed Grouse, 5; Snowshoe Hare, 2; mice, 2; Woodcock, 1; Black Duck, 1; and unidentified birds, 3. These stomachs were from birds taken within about 25 miles of Lincoln, Penobscot County, over a period of years in all months except February and May.

On October 27, 1945, at Ellsworth, Hancock County, a young Goshawk struck one of Weston's cork duck decoys and retained its grip on the 'victim' for some time.

Northern Sharp-shinned Hawk

Accipiter striatus velox (Wilson)

Summer resident, rather common throughout except on islands, where only occasional on the larger inshore ones; *transient*, common in spring and fall; occasional *winter resident.*

Spring. Migration extends from March 16 to May 8, with most birds seen from March 30 to April 16. This hawk arrives at Presque Isle from April 7 to 15 (Chamberlain).

Fall. This flight lasts from late August to November 23 or perhaps later. Largest numbers are seen September 4 to 18, chiefly along the coast and even out to offshore Monhegan. On the early date of August 17, 1895, at least 150 were seen flying southward at Jackman, Somerset County (Knight, 1896c: 177).

Breeding. "The nest is usually situated in a spruce, fir or hemlock tree, occasionally in one of the hard wood trees or even in a hole in a tree. The nests in trees are situated on horizontal limbs, composed of sticks and twigs, hemlock bark, cedar bark and similar material. Many nests are not lined, others are lined with fine cedar bark, grass, green hemlock twigs, pine needles and occasionally poplar leaves" (Knight, 1908b: 221).

Usually four or five eggs are laid, probably in late May or early June. A set of five eggs was taken on June 1, 1892, at Stockton Springs, Waldo County (ibid. 222). For outside of Maine, incubation has been reported (Forbush, 1927: 106) as lasting 21 to 24 days, and both sexes taking part. One young, from a brood of four, was captured when it tumbled out of a nest on July 20, 1940, near Orono, Penobscot County (R. Beaton). Young were still in a nest on August 1, 1937, at Berwick, York County (Norton). Fledging probably requires about 26 days. One brood is raised yearly.

Winter. There are at hand 21 records, since 1879, for December 21 to February 22. Of these, one is for Presque Isle (Chamberlain); two for Mt. Desert Island (Mrs. E. A. Anthony); six for Brewer (Hardy; Weston); and the remainder for Portland and vicinity and into coastal York County, as reported by N. C. Brown (1911b and 1913), Meyer (1914), the *Journal of the Maine Ornithological Society,* and unpublished notes. In several instances, as at Brewer, Mt. Desert Island, and Portland, individuals have stayed in the same locality all winter, and sometimes when the winters were quite severe.

Ecology. This little hawk is typically a bird of the borders of open woodlands and the edges of clearings. It seldom spends much time in extensive open areas, except in migration, as it sometimes falls victim to the larger hawks. In the fall migration, this bird is semi-gregarious, long loose flocks occasionally being seen traveling southeastward or southward.

Remarks. From 1895 or earlier to about 1918, according to Norton, this hawk was the most numerous one in Maine, but it now occurs in much smaller numbers than the Broad-wing.

There are several known instances of migrating birds falling into the

sea when flying off the coast, which probably indicates that the Sharp-shin is not capable of staying in the air for a long flight without resting.

Of 18 stomachs containing food, Mendall (1944: 200) reported song birds (mostly sparrows) in 16, frogs in 1, mice in 1, and grasshoppers in 1. The birds were taken within 25 miles of Lincoln, Penobscot County, over a period of years in April to October.

Josselyn (1674; 1865b: 76) reported "*Sparrow-hawkes*" in Maine, which might refer to the Sharp-shin since it is very like the Sparrow Hawk of Europe.

Cooper's Hawk

Accipiter cooperi (Bonaparte)

Summer resident, regularly uncommon, breeding chiefly in the northern two thirds of the state and in lesser numbers southward, perhaps rarely including larger inshore islands; *transient*, rather common in spring and fall; rare in *winter*.

Spring. Migration begins by March 24 (several records) and lasts until about May 11, with most birds seen from April 5 to 19. Two early records, that may be for either transients or winter residents, are for a bird seen on March 19, 1914, near Portland, and two on March 22, 1894, at Falmouth, Cumberland County (Norton).

Fall. Migration begins by September 6, reaches its peak from the 10th to 23rd, and is over by perhaps October 23. The few records from the latter date to November 30 may be for either late transients or wintering birds.

Breeding. The nest is in a grove or woodland of either coniferous or deciduous growth. A shady site, such as a pine tree, is preferred. The nest is of sticks, often added to a Crow's old nest, and generally lined with grass, leaves, or bark. Two to six (usually four or five) eggs are laid, probably at any time during May. Incubation is reported variably, from different parts of the range of the species, as 21 to 27 days (probably 23 or 24), both sexes taking part. Norton and Spinney visited a nest on May 10, 1926, at Georgetown, Sagadahoc County, that was built on a Crow's nest in a tall pine. One parent was present, apparently incubating. On June 14 of the previous year, there had been four young in this same nest, being so nearly fledged that they managed to escape on the 29th when Spinney climbed the tree. On August 4, 1874, Brewster (1925: 320) found four young, out of the nest but still being fed by a parent, at Upton, Oxford County. Fledging probably requires four weeks. One brood is raised yearly.

Winter. Sight records are: December 16, 1941, at Brewer (Weston); January 16, 1902, at Lewiston, Androscoggin County (Johnson *in*

Sweet, 1904c: 78); February 14, 1942, at Brewer (Weston); and March 2, 1941, near Portland (Norton). These records are all for single birds.

Ecology. This hawk is found more frequently in woodlands and less in forest edges than is its smaller relative, the Sharp-shin, and it preys on larger birds than does the latter. It prefers sites having a maximum of shade for nest-building. Like the Sharp-shin, it is semi-gregarious in fall, migrating in loosely formed flocks.

Remarks. The numbers of this bird in Maine never have equalled those of the Sharp-shin. To see a dozen in a day at any point where transients regularly are seen in fall is a far less likely event than to see twice that many Sharp-shins.

H. H. Waterman of Auburn, Androscoggin County, saw a Cooper's Hawk seize a Flicker and plunge it under water in a ditch, where the victim was held for about three minutes before the hawk was frightened away (Forbush, 1927: 115).

There was a hybrid hawk, formerly in the Hardy collection, "which the authorities have not agreed in placing closer than to say it is the offspring of two of the following, Cooper's, Sharp-shinned, Broad-winged" (Powers, 1905: 3).

Eastern Red-tailed Hawk

Buteo jamaicensis borealis (Gmelin)

Summer resident, regularly uncommon inland and on larger inshore islands; *transient,* regularly uncommon in spring and uncommon to rather common in fall throughout; *winter resident,* rare in coastal counties.

Spring. Migration extends from March 28 to April 30, with most birds noted during the first half of April.

Fall. Transients are noted from September 5 to November 6, with the majority seen from September 14 to 29.

Breeding. "They build a large bulky nest of sticks, twigs and bark, lined with bark and twigs. Usually in Maine they select a poplar, birch or ash as a nesting site, though using occasionally almost any tree available, and placing the nest from thirty to seventy feet up, generally in rather open swampy woods." The same nest may be used year after year, "though in some instances there are two or three nests in the vicinity which the birds may occupy from season to season." Two to four eggs, "perhaps more often two with us," are laid, usually in late April through early May. (Summarized from Knight, 1908b: 227.)

Knight (ibid.) recorded three eggs taken from a nest on May 6, 1895. Boardman (1907: 95) collected an egg on May 26, 1863; the locality

was probably near Milltown, New Brunswick, where he was living at the time. Incubation is reported variably, outside of Maine, as 28 to 32 days, the former figure probably being nearer correct. Fledging probably requires over six weeks. One brood is raised yearly.

Winter. Birds have been seen on an average of once in six years, the recent slight increase in records perhaps being due to more observers.

Ecology. This hawk is more of an upland than a lowland species. In Maine, it now is found more often in rather open woods or mixed or hardwood growth, as compared to former greater occurrence in extensive woodlands where coniferous trees predominated. This change in habitat preference has come about during the past 50 years.

Remarks. In the Lake Umbagog region, the Red-tail was fairly common until about 1890, present in reduced numbers to 1894 or 1895, and noted rarely thereafter by Brewster whose visits to the area ceased in 1909. Brewster (1925: 325) wrote, in part: "Their well-nigh total disappearance of late from a region where they have been so nearly free from human molestation, and where there are still extensive forests of large deciduous trees, would be surprising were it not for the coincident, and rather general 'fading out' of the species elsewhere. This is difficult to explain unless by assuming that, because of recent and widespread destruction of primitive forest-growths, New England *as a whole* has ceased to be attractive to Red-tailed Hawks. If so, their abandonment of the comparatively few and remote woodland areas unscathed as yet by axe or fire is not remarkable." According to Norton, this decline was paralleled throughout Maine during the same period. At the present time, this hawk is seen regularly in summer in quite a few places and, judging from all available data, may have increased slightly in the past decade.

Of 21 stomachs, Mendall (1944: 200) reported Meadow Mice in 8, insects (predominantly grasshoppers) in 7, Red Squirrels in 4, Garter Snakes in 2, a frog in 1, shrew in 1, Snowshoe Hare in 1, and one empty stomach. The hawks were taken probably within 25 miles of Lincoln, Penobscot County, over a period of years from April to November. "None had eaten game birds, but poultry was found in one, and the bird without food in its stomach was shot while killing a fowl."

Northern Red-shouldered Hawk

Buteo lineatus lineatus (Gmelin)

Summer resident, rather common throughout, and occasional on some of the larger inshore islands; *transient,* common in spring and fall throughout; *winter resident,* rare in coastal counties.

Spring. Migration begins about March 4 and ends by April 28, with the peak of the flight from March 15 to April 7.

Fall. Transients are noted from September 5 to October 28 or later, with most records from September 14 to 27.

Breeding and summer. "The bulky nest of sticks and twigs is usually placed on the limbs of hardwood trees at heights of twenty to seventy feet, and sometimes also in hemlock or spruces or even pines. The nest is usually placed on a limb or limbs and against the trunk, or sometimes out on the branches. Some nests are lined with hemlock or cedar bark while many contain the half opened catkins of willows and poplar, and often fresh green leaves of poplar or birch. The same nest is often used for many successive seasons" (Knight, 1908b: 228).

In the Portland region, Norton saw adults at nests as early as March 23, 1890, and March 29, 1910; the first nest contained three fresh eggs on April 26. Although two to six eggs are laid by this species, all Maine records at hand are for clutches of two or three. The earliest date is April 19, 1890, when Norton found three fresh eggs in a nest at Portland. Eight other Maine sets, including published records and data from Norton, Rich, and Eckstorm, are for fresh or slightly incubated clutches taken in southern counties from April 28 to May 6. Robbed nests have had second clutches completed by May 24 (Norton). The incubation period is reported variably, outside of Maine, as 25 to 28 days, and Knight (1908b: 229) gave 27 days. The young are fledged in four to five weeks. One brood is raised yearly.

Occasional adults, perhaps having lost their eggs elsewhere, have been seen on outer islands in early summer.

Ecology. This hawk is, in general, a lowland species. It is more of a woodland bird than the Red-tail, inhabiting groves surrounded by open fields, or extensive areas of mixed or, more often, deciduous growth. It also shows a stronger tendency to nest near water than does the latter.

Remarks. "That the Red-shouldered Hawk should have remained almost unknown in the Umbagog Region until after the Red-tailed Hawk had practically ceased to reappear, and that not long thereafter it should have apparently established itself as a summer resident in at least two localities, are matters of considerable interest, in view of the fact that throughout much, if not most, of Massachusetts there has been essentially similar and contemporaneous replacement of the greater by the lesser bird" (Brewster, 1925: 327). The Red-shoulder has maintained its ascendancy in numbers at Umbagog and elsewhere in Maine, undoubtedly because of removal of the original forest and its replacement by mainly deciduous woodland.

Knight (1908b: 229) wrote: "In nests with young there are often

found mice, rats, squirrels, frogs and sometimes chickens. The old birds feed on similar material, various mammals, snakes and other reptiles constituting the greater portion of their food, but small birds, game birds and poultry are also taken to some extent. They certainly destroy enough injurious mammals to offset the damage they do to poultry."

Of 14 stomachs of this hawk, Mendall (1944: 200–201) reported insects in 7, snakes in 3, shrews in 3, frogs in 3, song birds in 3, mice in 2, a large bird (possibly Ruffed Grouse) in 1, Snowshoe Hare in 1, and a mass of plant material in 1. The birds were taken probably within 25 miles of Lincoln, Penobscot County, over a period of years from April through September.

Northern Broad-winged Hawk

Buteo platypterus platypterus (Vieillot)

Summer resident, uncommon to rather common (in unsettled areas) throughout, including larger wooded islands; *transient,* common in spring and fall throughout.

Spring. Transients are noted from April 3 to May 5, most birds being seen from April 17 to 30. Two early records are for March 29, 1910, at Manchester, Kennebec County (Pope *in* Sweet, 1911b: 63), and March 31, 1905, at Skowhegan, Somerset County (Swain *in* Sweet, 1906b: 36). On April 30, 1940, more than 75 were seen at Hebron, Oxford County (R. S. Davey).

Fall. Migration extends from August 28 to October 18, with the peak of the flight from September 7 to 26. A remarkable flight of over 900 birds was seen on September 16, 1945, and 33 birds the following day, at Cape Rosier, Hancock County (R. C. Allison, and others). About 80 were seen in less than an hour, 21 birds being in sight at one time, on the morning of September 18, 1943, at South Brooksville in the same county (K. Tousey). Late stragglers have been noted on October 30, 1884, at Lake Umbagog by Brewster (1925: 328), and on October 30, 1910, at Manchester by Pope and at Ellsworth, Hancock County, by Miss Stanwood (*in* Sweet, 1911b: 63).

Breeding. The yellow birch is a favorite nesting tree for this hawk, but occasionally it builds in evergreens (C. Stanwood). "Both birds help build the nest and take turns in incubating. Unlike many other Hawks they seem rarely to reoccupy the same nest another season. The nest is the usual structure of sticks and twigs, lined with bark, hemlock twigs and often with green leaves and twigs of poplar, elm and basswood" (Knight, 1908b: 232).

Two to four eggs are laid, most Maine records being for two or three. In Oxford County, apparently, Carpenter (1884a: 9) found a nest with four eggs on May 2. On May 3, 1936, Norton found a new nest at Portland; it had very small young in it on the 30th. Clutches of three slightly incubated eggs were found on May 16, 1939, at Holden, Penobscot County, and on May 26, 1914, at Dedham, Hancock County, and clutches of two fresh eggs on May 17, 1939, and on May 22, 1940, at Dedham, all by Eckstorm. At Ellsworth, Hancock County, Miss Stanwood found a nest on May 10, 1919, two eggs being incubated on the 18th, and, on June 22, two young believed to have been about five days old. Brewster (1925: 332) found two eggs about to hatch on June 8, 1897, at Pine Point, Lake Umbagog, and Tyson and Bond (1941: 56) gave June 12 as a date for eggs on Mt. Desert Island. The incubation period is reported, in Massachusetts, as 23 to 25 days (Burns, 1911: 267–268). At Ellsworth, Miss Stanwood observed fledging to be "about 40 days," a period which is in agreement with that indicated by Burns' (ibid. 276) report of a captive young bird being able to fly well at 40 days of age. One brood is raised yearly.

Ecology. This is a bird of hardwood and mixed forests, tending to nest near watercourses or in swamps. Brewster (1925: 329) aptly termed the Broad-wing as a "constitutionally phlegmatic and inert" species. The young especially are very unwary. The bird is semi-gregarious when migrating.

Remarks. The slight evidence seems to indicate that this hawk was increasing in numbers in the latter decades of the 1800's, but has since declined steadily, mainly from shooting. Even so, it is the most common of the hawks throughout most of Maine.

Of 58 stomachs of this hawk, Mendall (1944: 201) reported insects (beetles and their larvae in 23, caterpillars in 12) in 37, frogs in 15, mice (Meadow and Red-backed) in 15, moles and shrews in 13, snakes (Garter Snakes most often identified) in 12, Snowshoe Hares in 6, song birds in 5, spiders in 3, and a toad, Red Squirrel, and crustacean each in 1. The birds were taken probably within 25 miles of Lincoln, Penobscot County, during a period of years from April through September. When the young were still in the nest studied at Ellsworth, Miss Stanwood found the remains of a Star-nosed Mole, a Red-backed Mouse, and a Red Squirrel.

Brewster (1925: 329) has written an excellent account of the toad-hunting habits of this hawk in early summer at Lake Umbagog. I have observed similar habits on the Upper Magalloway, north of Umbagog, where the Broad-wings perched on stumps and even floating water-soaked logs to watch for their prey.

A hybrid hawk, one parent perhaps being of the present species, has been mentioned previously under Cooper's Hawk.

Swainson's Hawk

Buteo swainsoni Bonaparte

Four records (possibly five). One was taken on September 15, 1886, at Gouldsboro, Hancock County (Brewster, 1887c); another on May 19, 1888, at Glenburn, Penobscot County (Brewster (1888); a third about October 8, 1892, at Calais, Washington County (Boardman *in* Webster, 1893: 30; Brewster, 1893: 82); and Knight (1908b: 230) quoted Hardy as stating he had seen at least two specimens from Penobscot County, but it is not indicated whether the Glenburn bird was included in these.

Remarks. All birds were in the melanistic phase, except for the Calais one which, from the description, appears to have been intermediate in color.

American Rough-legged Hawk

Buteo lagopus s-johannis (Gmelin)

Transient and *winter resident,* varying from rather common in some years to probably absent in others. Reports of summer occurrence are considered questionable.

Fall. The Rough-leg usually does not arrive until November 17 or later, and, rarely, as early as October 21. Very early records are for several seen September 13 to 15, 1941, at Mt. Desert Island (A. C. Bagg), and one seen on October 12, 1940, from the summit of Mt. Bigelow, Somerset County (N. P. Hill, and others).

Winter. Quite a few of these hawks were present in the winter of 1903–04 (Noble, 1904a). Unfortunately, Maine records are too fragmentary to indicate numbers, or even seasons of presence or absence with any degree of accuracy. Records of taxidermists might provide valuable data on these points.

Spring. This hawk usually has departed by March 16, but there are these later records: two seen on March 24, 1938, over western Penobscot Bay, and a female shot on March 28, 1911, at Falmouth, Cumberland County (Norton); one seen on April 3, 1944, at Bangor (Mrs. P. Hannemann); one seen on April 19, 1941, on Mt. Desert Island (Weston); one shot on May 3, 1935, at Great Head on Mt. Desert Island (Tyson and Bond, 1941: 57); and a report of one seen between May 28 and June 3, 1946, at Southwest Harbor, Mt. Desert Island, by Mrs. H. Mann.

Ecology. This is a bird of open places, such as large fields, shores of lakes, extensive marshes, bogs, and unforested areas on islands.

Remarks. Brewer (*in* Baird, Brewer, and Ridgway, 1874, 3: 310) wrote: "A pair was found breeding near the mouth of the Kennebec River in Maine, and the eggs were secured." And further (ibid. 311–312), he described an egg "from near Wiscassett," Lincoln County, stating that one of the adults at the nest was collected. C. J. Maynard (1909: 116) reported seeing a pair on July 2, 1909, below Bath on the Kennebec River. I question the accuracy of both of these published reports, especially of breeding.

The March 28th specimen from Falmouth, cited under Spring, had eaten a Meadow Mouse (Norton). Mendall (1944: 206) reported that three birds, probably taken within 25 miles of Lincoln, Penobscot County, had eaten mice.

Field observations made by Norton on March 24, 1938, were as follows: "In crossing West Penobscot Bay during a light northwest wind, one of these hawks came from the direction of Ash Point, making for Fox Island Thoroughfare. When first seen, it was at an elevation of perhaps 30 feet above the water, alternately flying and soaring; then it swept down just above the water's surface and flew onward. Another one, of similar appearance in color, was seen over Widow's Island, scaling like a harrier, then poising like a Kingfisher, over the open grassland of the island, working against the fresh breeze of the northwest wind. It was very graceful in flight."

American Golden Eagle

Aquila chrysaëtos canadensis (Linnaeus)

Occurs throughout most of the year, *breeder* in two or three counties, but whether those nesting in Maine perform short or long migrations is not known; *transient* in small numbers in spring and fall.

Spring. It is not certain whether the few late February and early March records for the coast and for inland areas away from mountains are local birds wandering from their nesting territories or transients.

Fall. Most sight records and captures are this season. Wandering or migratory adult and young birds are seen on the coast from August 24 into November, although only occasionally after October 14. A early coastal record is for one seen on August 10, 1932, at Wiscassett, Lincoln County (R. T. Peterson), and the latest specific coastal date is for a female shot on November 17, 1894, on Isle au Haut (Bob Black, 1894). Throughout the fall, birds are seen about inland mountains.

Breeding. Only cliff nests are known in Maine. In one instance, two nests are close to each other. Undoubtedly these were built by the

same birds, since elsewhere this species is known to use adjacent nests on alternate years. The nest is of sticks or branches, lined with twigs and various plant materials, additions being made throughout the nesting season. It is probable that two eggs make a clutch, and that they are laid in March. Outside of Maine, incubation has been reported variably as 28 to 45 days, probably being about 40. The young probably attain flying age in about ten weeks. One brood is raised yearly.

Winter. There are no records for December at hand, but the species undoubtedly is present. There are records for inland from January 7 on.

Ecology. This bird is strictly a cliff-nesting species in Maine, although one may expect to find it almost anywhere, inland and on the coast, outside of the breeding season. Coastal occurrences merely indicate that the coastline defines a flyway, for this eagle does not show a partiality for the vicinity of water as does the Bald Eagle. In hunting, the Golden Eagle flies low over woods and brushy or treeless areas, often flushing its quarry at very close range, whereas the Bald Eagle hunts from a greater height.

Remarks. This eagle is not a new addition to the breeding fauna of the state. There is very good evidence that it nested as far back as the late 1600's at least, and the kind of eagle that nested on mountain cliffs was a conspicuous element in the folklore of the native Indians. These matters have been discussed by Mrs. F. H. Eckstorm (1936). Among other things, she pointed out that the "pilhannaw, or mechquan" of Josselyn (1672; 1865a: 40–41) was the Golden Eagle.

In the past 100 years, the Golden Eagle has bred in four or five counties in the state. At present, it breeds in only two, or possibly three, of these, and at least four different sites probably are in use. The other known sites were abandoned when nearby areas where brought under cultivation. Considering the rarity of this bird as a nesting species, and the possibility of their being molested, it seems inadvisable to divulge the localities of eyries at the present time.

The reason for believing that this bird is transient in Maine is that the numbers of records for coastal counties, as well as those for farther south in New England, is certainly in excess of the number of birds from Maine eyries alone.

Hardy (1900) gave 8¾ pounds as the weight of a specimen. His journal shows that this bird, an adult male, was killed on March 12, 1880, in Penobscot County. A female, shot on March 18, 1893, in the Province of Quebec, weighed 10 pounds and 14 ounces (Roberts, 1893).

Two adult and two young Golden Eagles and a nest, collected in Oxford County, formerly were in the Brooklyn Institute of Arts and

Sciences. A photograph of the group and a few facts about it are to be found in the Institute's *Report* for 1906.

G. M. Allen (1903: 100), citing an account by C. A. Hawes of finding a nest in July, 1876, in New Hampshire, stated that this appeared to be the last breeding record for that state. There is reason to believe that the species may have bred recently in the Adirondacks.

Northern Bald Eagle

Haliaeetus leucocephalus washingtonii (Audubon)

Resident (? performing short or long migrations), in summer, regularly uncommon throughout, and in winter, common to sometimes numerous in a few localities on the coast; *transient*, numbers unknown, mainly coastwise.

Spring. There is a noticeable shift in population in January and to about March 10, when many birds leave the wintering areas for their nesting territories. A few, mostly immature birds, remain until late April or later. On April 26 and 27, 1935, near Cherryfield, Washington County, there were two adult birds, eight first-year, and 15 second- or third-year birds seen (Gross).

Fall. Beginning in August, small companies, usually family groups, gather at suitable feeding places along rivers, or on lakes and ponds, or on the coast. Migration, occurring in September and October, is more noticeable in some years than in others, for transients often fly at a high altitude and may pass unobserved. On September 16, 1945, fifty-two birds were seen at Cape Rosier, Hancock County (R. and M. Emery; R. and P. Allison); one day in October, 1932, about 30 were seen migrating in a loose flock at Damariscotta Lake, Lincoln County (Bent, 1937: 346). A bird was banded November 5, 1934, at Kittery Point, York County, and recovered on October 22, 1935, at Richlieu Village in the Province of Quebec (M. T. Cooke, 1941: 155). That a few remain inland after the freeze-up is shown by occasional reports of these birds feeding on foxes in traps in November.

Breeding. Nests are at varying heights in live or dead coniferous or deciduous trees, perhaps large live white pines being most often selected. Bent (1937: 339) found a nest in a dead yellow birch, "only 10 inches thick near the base," on an island in Jericho Bay. The nest is built of limbs and branches and lined with smaller twigs and other vegetation, sometimes including pieces of grassy turf. The same nest is used on successive years, with additions made before and, in lesser amounts, during incubation and even fledging. When a nest finally falls down, another often is built close by.

Spinney noted a pair of birds staying about a nest from January 5 on, in 1925, in Sagadahoc County; Weston saw two birds perched beside a nest on February 28, 1940, in Hancock County; and Norton saw a nest, "under repair," on March 24, 1929, in Sagadahoc County. Data on completed clutches in Maine show that two, and less often three, eggs are laid. The earliest date is March 26, 1880, when Spinney collected a set of three fresh eggs in Sagadahoc County. Eleven other sets, mentioned in the literature or in data from Spinney, Harris, and Norton, were taken from April 1 to 23, with incubation noted as "slight" to "advanced." Apparently in Oxford County, Carpenter (1884a: 9) found a set of eggs, "greatly advanced" in incubation, on April 4, 1883, indicating that laying occurred in the interior of Maine by the middle of March. The finding of a single young, already six or seven inches long, on April 27, 1865, in a nest on the Damariscotta River, Lincoln County (Baird, Brewer, and Ridgway, 1874, 3: 332–333) would indicate laying in early March near the coast.

According to F. H. Herrick's (1932: 318–321) studies in Ohio, incubation is by both parents and lasts 34 or 35 days, but may be longer if interrupted. The nearest to a hatching date for Maine is for a clutch of two eggs that I found to have hatched between April 26 and May 2, 1932, in Sagadahoc County. Herrick (1924: 226–227) also found that fledging required ten to eleven weeks, the young leaving the nest either voluntarily or being lured away by food carried by one of the parents, and the nest was used for a perch for several weeks thereafter. Dates for last young leaving Maine nests, near the coast, are June 29 (Norton) and July 20 (Palmer). The family remains together for a period after the young are fledged, perhaps well into autumn. One brood is raised yearly.

The birds attain the adult plumage (white head and tail) in not less than three years. F. H. Herrick (1924: 217) believed that sexual maturity was attained in one year. In 1938, Eckstorm found a nest with fertile eggs, one of the pair of eagles in attendance being in adult plumage and the other in brown.

Winter. After the birds arrive at the coastal wintering places, there are local movements of the population, depending on availability of food. If our bays freeze over during very cold weather, most of the birds move southwestward, sometimes out of the state. At such times, considerable numbers have been seen at Newburyport Harbor, Massachusetts, and on adjacent waters. The farthest inland record for this season is for one seen by Weston on January 7, 1942, at Ripogenus Dam, Piscataquis County. Undoubtedly some birds from farther north and east winter on our coast.

Ecology. This eagle is a tree-nester in Maine and, as elsewhere,

generally is found rather close to water at all seasons. A number of persons have noted that several pairs will nest rather near one another at favorable feeding places. Largely a scavenger, it also is parasitic on the Osprey.

Remarks. Several pairs bred formerly on Roque Island, Washington County (Longfellow, 1876). A "colony" of these birds used to nest about Merrymeeting Bay (Anon., 1898b). In the 1820's, thirteen eagles circled about when Manly Hardy's father climbed a nest on Peaks Island in Casco Bay, but "eagles were then more numerous on our coast, as rifles and strychnine have greatly reduced their numbers" (Hardy, 1908). In the early 1890's, Spinney knew of 15 occupied nests on the lower Kennebec below Bath; by 1908, these had been reduced to three. Knight (1908b: 236) estimated that not over 100 pairs were breeding in Maine at the time he wrote. The current estimate, believed to be liberal, is not over 60 pairs. These eagles and their nests, being large and conspicuous, are subject to molestation by humans. A few birds inland are shot by trappers, because the eagles prey to some extent, in fall, on animals caught in traps. In town meeting at Vinalhaven in 1806, a motion was carried to pay a bounty of 20 cents per head on eagles (Lyons and others, 1889: 17).

This eagle feeds mostly on dead or injured birds or mammals, dead fish or those nearly stranded in shallow water, or fish taken by force from the Osprey in flight. They have been reported fishing, in Maine or nearby, by Roamer (1874: 324), Boardman (1875), Brewster (1880: 58), Hardy (1883), and several others. In one instance, apparently near Calais, one of these birds was seen to strike some object in the water, perhaps a seal, and was drawn beneath the surface (Boardman, 1875). Josselyn (1672; 1865a: 43–44) wrote: "They [adults and young] are both cowardly *Kites*, preying upon Fish cast up on the shore. In the year 1668, there was a great mortality of eels in *Casco Bay*; thither resorted, at the same time, an infinite number of *Gripes* [Bald Eagles]; insomuch that, being shot by the Inhabitants, they fed their hogs with them for some weeks." A similar event was recorded by Brewster (1880: 58): "During the past season [1879] a mortality occurred among the suckers at Lake Umbagog, and thousands were left upon the marshes and flats by the receding water. The Eagles assembled in such numbers that no less than twenty-five were counted in one day." Norton (1907d: 321) reported an eagle killing two Herring Gulls at Great Duck Island, Hancock County. In the bays where both Bald Eagles and ducks are together in winter, as at Back Cove, Portland, the capture of an occasional waterfowl generally results in condemnation of the eagles by local observers. From long observation, Norton was inclined toward the belief that relatively few

healthy birds ever were captured. In a storm on June 9, 1933, a nest containing two eaglets was blown down at Mt. Desert Island; when A. Stupka examined the fallen nest, among items he found in it were three Osprey legs.

For many years the Boston Society of Natural History had on exhibition a mounted Bald Eagle, said to have been taken as a nestling from a nest near Bangor in May, 1827, to have been kept in captivity for 20 years, and to have been the model for Audubon's plate, showing an adult bird eating a catfish, in his *Birds of America*. That Audubon used this bird for a model was an error dating back to an entry in the Society's catalogue when the specimen was accessioned. It first appeared in print in Ridgway (1874: 68). For many years the Society sold postcard pictures of this bird and gave it a full-page halftone (p. 101) in *Milestones*, the 1930 centennial publication of the Society. In April, 1935, the late J. F. Fanning, of Portland, wrote to the director of the Society's museum, pointing out the error. Audubon's original drawing was done on the Mississippi in 1820, before the Bangor bird existed, and was re-done in 1828, before the specimen in question could have attained the white head and tail of the adult plumage shown in the artist's plate. Kennard (1936) published a correction of the long-standing error.

A bird of unstated sex and age, killed at Scarborough, May 10, 1912, weighed 6½ pounds (Norton); Hardy (1900) gave 9¼ pounds as the weight of another. Hardy's journal shows that the latter, "probably" a male, was killed on February 7, 1880, by flying against a tree in Orrington, Penobscot County.

Eagle bones, of unstated species, were found in an Indian shellheap at Lamoine, Hancock County (Moorehead, 1922: 166). Rosier (1605) saw eagles at St. George, Knox County. Mention of "Eagles" and "Gripes" along the New England coast, by Capt. John Smith (1616: 47), undoubtedly referred to Bald Eagles.

The numerous topographic features in Maine with which the name Eagle is linked, were listed by Attwood (1946: 140–141). Many of these indicate where the bird formerly nested or hunted, but is now only a visitor. See also p. 64, where I have discussed the corruption of the Abnaki word for eagle.

Southern Bald Eagle

Haliaeetus leucocephalus leucocephalus (Linnaeus)

Two records. On August 7, 1890, Norton shot an adult male at Cliff Island in Casco Bay, measurements being: wing, 574 mm.; tail, 243

mm.; and culmen, 60 mm. One, banded as a nestling on January 21, 1942, at St. Petersburg, Florida, was found dead on August 20 of the same year at Burnham, Waldo County (Broley, 1947: 4).

Remarks. Other published references to occurrence of this subspecies in Maine appear to be based on the erroneous belief that the state is within its breeding range.

Birds banded as nestlings in Florida also have been captured in Quebec, New Brunswick, Nova Scotia, and Prince Edward's Island (Broley, ibid.).

American Marsh Hawk

Circus cyaneus hudsonius (Latham)

Summer resident, rather common in suitable localities throughout, including inshore islands; *transient,* common in spring and fall throughout; one *winter* record.

Spring. This species is seen regularly in southwestern coastal counties by March 25, and occasionally from March 19 to 24. Three early records are for birds seen March 14 and 15, 1908, in the Portland region (*in* Brownson, 1909: 82), and March 16, 1945, at Brunswick, Cumberland County (C. Packard). Weston's earliest record for Brewer is March 20, 1946, and Chamberlain's for Presque Isle is March 29 of unstated year. Migration reaches its peak throughout the state during the first 12 days of April and ceases about May 5.

Fall. Transients are noted from late August to October 29 or later, most birds being seen the first three weeks in September. On July 27, 1946, there was a "definite movement" of this species in the Muscongus Bay region (Cruickshank). Norton noted a female, probably migrating, on offshore Matinicus Rock, Knox County, on August 15, 1916. Published records for Monhegan range from September 9, 1918 (Dewis, 1919: 39), to October 15 of that year (Wentworth *in* Jenney, 1919: 26). The largest number reported seen in a single day was 25 on September 16, 1945, at Cape Rosier, Hancock County (M. and R. Emery). Very late dates are November 9, 1882, in the Portland region (N. C. Brown, 1882f: 22), and, "very exceptionally it has been taken as late as November twelfth" (Knight, 1908b: 219).

Breeding. "Their nest of weeds, grasses, rushes, and similar material is well made, placed on the ground in a marsh or meadow and concealed quite well by the growth around it. Often a nest will contain fresh or slightly incubated eggs along with others in various stages up to those nearly ready to hatch" (ibid. 220). Three to six (usually five)

eggs make a clutch. In Maine, laying probably occurs in May. Actual dates for eggs or young are: six eggs, perhaps half incubated, about May 20, at Damariscotta, Lincoln County (T. M. Brewer, 1857: 44); four eggs in "varying stages of incubation" on June 4, 1892, at Bangor (Knight, 1908b: 220); three eggs, advanced in incubation, on June 6, 1941, at Mt. Desert Island (Eckstorm); and four young, of unstated age, in the "middle" of June, 1879, at Brunswick (Lee, 1880). Outside the state, the incubation period has been reported variably by different authors as 21 to 31 days; probably it is near the latter figure. In New Jersey, Urner (1925: 40) found that both sexes incubate and take care of the young, which are fledged in about 30 to 35 days. One brood is raised yearly.

Winter. One was seen on December 31, 1939, on Monhegan (Mrs. J. A. Townsend).

Ecology. This hawk is a persistent hunter of Field Mice (*Microtus*), reptiles, amphibians, and insects, particularly in damp swales or marshes. Hunting territory along the coast sometimes includes several adjacent islands, a mile or more apart, and one or both members of a pair shift from island to island at fairly regular times of the day during summer. On some inshore islands, a few individuals have adopted the habit of subsisting on flightless young terns. In Cumberland County in August, Norton several times observed these hawks on the ground, half running, half flying, as they pursued grasshoppers in open fields. This species is more crepuscular than many hawks, feeding regularly until nightfall. Migrants feed largely on smaller birds.

Remarks. This hawk has decreased slowly throughout Maine, but still is a regular inhabitant of most of the terrain suited to its nesting requirements. It has held up in population better than other hawks of its size, the main factor in its favor being the larger broods produced in comparison with the others.

Of 36 stomachs containing food, the hawks being collected from April to October probably within 25 miles of Lincoln, Penobscot County, Mendall (1944: 201) reported mainly Meadow Mice (but moles or shrews in 2) in 17, non-game birds (predominantly sparrows) in 12, poultry or game birds (Ruffed Grouse in 1, Black Duck in 2) in 7, frogs in 3, insects in 2, and snakes in 2. He pointed out (ibid. 202), however, that this study was limited in scope and should not be used as a basis for condemning this hawk as an undesirable species.

Two adult males, killed in spring in Cumberland County, weighed 12½ and 15 ounces, and two females 19 ounces each (Norton).

Family PANDIONIDAE

American Osprey

Pandion haliaetus carolinensis (Gmelin)

Summer resident, common on the coast and islands from Casco Bay eastward and uncommon (locally common in a few places) on inland waterways; *transient,* common in spring and fall coastwise, and in lesser numbers inland; four *winter* records.

Spring. Migration occurs from March 28 to May 8, most birds being seen from April 3 to 19. Two very early records are for birds seen March 19, 1910, at Wells, York County (Spinney), and March 26, 1884, at Westbrook, Cumberland County (Norton). Most early records for points well inland are after April 4. For Rangeley, Franklin County, Richardson (1896) reported the first bird of the season seen on April 15, 1896, when the snow was nearly three feet deep.

Fall. Migration lasts from about September 4 to October 22, the peak of the flight occurring in the second and third weeks of September. Relatively few birds are seen after October 7. Three very late dates for single birds seen are November 1, 1946, at Bangor (F. Dean), November 14, 1946, at Long Pond, "about 40 miles from Bangor" (Mrs. P. Hannemann), and November 22, 1913, at Falmouth, Cumberland County (Norton).

Breeding. This bird tends to nest in small colonies (see Remarks), and the same nest is used on successive years. Nests sometimes are located on the ground, but more usually on the tops of derricks, beacons, spindles and other navigational aids, bluffs, rocks, trees, telegraph poles, and on platforms placed on wiers and elsewhere for them by fishermen. Nests are built of branches, driftwood, seaweed, eelgrass, a great variety of other plant materials, in fact, almost anything available is used, with the lining of the finer materials. After more than 40 years' observations along the coast, Norton, in a manuscript note, wrote: "It is noticeable that, with much less driftwood than was common 20 years ago, and the present [1937] absence of eelgrass, Osprey nests are much less bulky than formerly and very deficient in number of sticks. Using materials now available, they build nests which are very low and inconspicuous, those on rocks being visible only at short range." Knight (1898a: 12) reported nests having additions made to them in July and August. Another, at Pulpit Harbor in North Haven, Knox County, was begun in the fall of 1934, and more material added in early 1935 before the first clutch of eggs was laid in it (Norton). On April 15 and 16, 1923, Norton saw pairs at several nests about Pulpit Harbor; one bird was sitting on a nest but it proved to be empty.

Two, more often three, and rarely four, eggs make a clutch, and are laid from early May to early June. The earliest records are for three fresh eggs taken on May 8, 1878, at Carver's Harbor in Vinalhaven, Knox County (J. P. Norris, 1891: 164), and a set of four fresh eggs taken on May 9, 1879, at Vinalhaven (Eddy, 1882). Incubation probably requires 35 to 38 days, although it has been reported, outside of Maine, as a much shorter period, and is mainly by the female. The earliest record of young is for two very small birds on June 6, 1937, at Sheep Island, near North Haven (Norton). Fledging probably requires about 55 to 65 days. One brood is raised yearly.

Winter. Four winter records are: one seen on December 9, 1906, at Portland (*in* Brownson, 1907c: 37); one shot on January 1, 1919, in Brunswick or vicinity, Cumberland County (Walch, 1926: 22); one seen on January 20, 1945, at Eagle Island in Casco Bay (C. Packard); and one seen on February 19, 1947, in the Bar Harbor region, Mt. Desert Island (Hersey *in* Gross, 1947f: 33).

Ecology. The Osprey is always found in the vicinity of water. In feeding, it hovers over the water, then plunges from an altitude, usually under 100 feet, to catch a fish, sometimes submerging completely. In one instance at Blue Hill, Hancock County, one was dragged under water and drowned, apparently being unable to release its grip on a large fish (McAdoo, 1930). Sometimes the Osprey will eat freshly killed fish thrown overboard (Palmer). This bird often is parasitized by the Bald Eagle, but seldom does it attempt a 'retaliatory' attack, though this has been reported by Burr (1912) and Storer (1940).

At several points on our coast, Ospreys nest near colonies of Great Blue and Black-crowned Night Herons; the Ospreys dive at the herons whenever the latter chance to fly near the hawks' nests. Hardy (1896b: 114) wrote: "Of late years, all along our coast, Fish-hawks, which formerly always nested in trees, have been forced by the trees in many places either being cut or blown down, to find other nesting sites, or abandon their old fishing-grounds."

Remarks. About 1866 or 1867, there were about ten or a dozen nests at a point on the Damariscotta River, Lincoln County (Richards, 1910); in 1870, there were 15, probably 20, nests within a mile square area at Harpswell, Cumberland County (Woodman, 1870); about 1873, there were 14 occupied nests on Green's Island, Vinalhaven (E. D. Rackliff); and about 1885, thirteen pairs nested at Great Pond Marsh in Phippsburg, Sagadahoc County (Spinney). There also were colonies in Penobscot and Jericho Bays. By 1900, however, few, if any, birds nested at these various localities.

Norton, in a manuscript note, offered a strongly-worded explanation of this bird's decrease on the coastal nesting grounds, as follows:

"Persons of mature and well-ordered minds seldom molest these birds, which are regarded as harmless and industrious. There is a degree of reverence, and even superstition, against killing an Osprey on the Maine coast. During the two decades of 1880 and 1890, there was an influx of foreign-born people into the state, whose primitive conception of hunting was abetted by an abundance of cheap fowling pieces and ammunition. Reverence and superstition were ignored. These fine birds paid the penalty of being abundant and solicitous of the welfare of their nests; the birds were attractive targets for the blood-thirsty beings who deemed themselves 'sportsmen' in destroying hawks. Another cause of destruction was the market value of richly-colored bird eggs among collectors; the handsome eggs of this hawk were easy to obtain and brought a few cents in the egg market."

The situation changed for the better, however, and by 1935, these birds were beginning to reoccupy their former nesting grounds, though in much fewer numbers than formerly were present. The Osprey appears to have increased very slightly during the past ten years, so that now there are at least 300 pairs in the state. At some points on the coast, the old superstition — to kill an Osprey brings bad luck—operates in their favor.

There are little specific data on food of this bird in Maine. Knight (1908b: 250–251) gave a detailed list of fish which included trout and salmon; he said, however, that according to his experience, these two fish seldom were taken. Norton noted suckers and a flounder in various nests. Fallfish may be a regular food item at some inland points, as I have observed on the Upper Magalloway, Oxford County.

A nest in a dead pine on a small islet [now submerged by a raised water level] in Sebago Lake, Cumberland County, was reported to have been occupied for over 30 successive summers (Black Spot, 1886). A nest on a ledge at the entrance to Pulpit Harbor is known to have been occupied for nearly a century (Norton).

The "Wilde Hawkes" of Capt. John Smith (1616) were Ospreys.

Family FALCONIDAE

American Gyrfalcon

Falco rusticolus obsoletus Gmelin

Visitant, occasional from fall to early spring throughout, the extreme dates being "about the middle" of September and "about March 22."

Records. Definite records where actual or approximate dates and color of the birds are known are listed below, the birds being divided

into four color groups. It will be noted that dark birds occur most often. At least a dozen additional occurrences are known, but data are too fragmentary to include them here.

Very light. One was shot on October 8, 1893, at South Winn, Penobscot County (Brewster, 1895a); one seen at very close range in January, 1929, at Cumberland Center, Cumberland County (W. Blanchard); and one seen on November 4, 1934, on Cadillac or Green Mountain, Mt. Desert Island (Tyson and Bond, 1941: 57).

Gray. One was shot on October 13, 1877, at Cape Elizabeth (N. C. Brown, 1882f: 1–2; Knight, 1897b).

Dark Gray. One was captured alive in December, 1876, at Katahdin Iron Works, Piscataquis County (Purdie, 1879); one, for which data are lacking, taken in Maine before 1899 (Knight, 1899a: 1); one shot on December 11, 1906, at North Deering in Portland (Norton, 1907b); a female shot on March 7, 1907, at Jaquish Island, Harpswell, Cumberland County (Knight, 1908b: 242); and one, seen for several days, killed on October 22, 1925, at Merrymeeting Bay (Walch, 1926: 21–22).

Very dark. A female was shot in November, 1886, at Wheeler's Ledge, Metinic Island, Knox County (Norton), and recorded as received from Rockland, by Brewster (1887a); one shot about the middle of September, 1887 (Knight, 1897d: 64), the locality being the Spurwink River, Scarborough (Norton, 1907b: 19); a female shot about March 22, 1888, at Eagle Island [? Penobscot Bay] (Brewster *in* Minot, 1895: 480); one shot in March or earlier, 1898, by Mr. Doughty of East Waterford, Oxford County (Knight, 1898c); a female shot on December 21, 1898, at Bangor (Merrill, 1899); "two years ago I was very near a Black Gyrfalcon and today [December 10, 1900] I saw another" (Hardy, 1901), probably both at Brewer; one taken on October 20, 1905, at Alton, Penobscot County (G. M. Allen, 1908a: 234); and one in "dark phase" seen in early October of unstated year on Mt. Desert Island (Tyson and Bond, 1941: 57).

Remarks. The stomach of a bird killed in January, probably in Penobscot County, contained poultry (Mendall, 1944: 207). This is not one of the specimens cited above.

Norton (1901a: 6) reported a white Gyrfalcon taken in Maine, but later (1907b: 20) corrected the error.

American Peregrine Falcon; Duck Hawk

Falco peregrinus anatum Bonaparte

Summer resident, rare breeder in a few mountainous areas inland and at a few localities on the eastern half of the coast; *transient,* regularly

uncommon in spring and usually rather common in fall, chiefly coastwise.

Spring. Migration, mainly in the first half of April, extends from late March to May 7 or later. Earliest records are for a bird seen on March 14, 1901, at Westbrook, Cumberland County (Norton, 1901b: 27), and one arriving at a nesting site as early as March 23, in Hancock County (B. W. Barker, 1935). Birds are still migrating along the coast after incubation has begun at inland points.

Fall. There is considerable wandering in August, but migration does not begin until about September 17 and ends by October 20, most birds being seen from October 2 to 12. A freshly killed bird was brought into a taxidermy shop in Portland on November 7, 1907 (Norton).

Flight years. In *1898*, there was a marked flight in the fall at Seguin (Spinney, 1899a), and in *1904*, there was another there in the fall (Spinney *in* Swain, 1904c: 70).

Breeding. This bird lays its eggs on ledges in cliffs, no actual nest being made. Sometimes, however, if there is soil or loose material present, the bird may scratch out a slight cavity for a nest. Birds have been seen at nesting sites the first week of April in several different years in Penobscot and Hancock Counties (Eckstorm, Weston), but no eggs were present. Usually three or four eggs make a clutch. Actual egg dates, all from Eckstorm's records, are: April 26, 1939, three fresh eggs, in Hancock County; April 29, 1940, four fresh in Penobscot County; and May 10, 1942, four slightly incubated eggs in Somerset County. Eggs may be laid at intervals of two days or more, and incubation begun before the clutch is completed. The incubation period has been determined in Massachusetts as 33 to 35 days, both adults taking part, and fledging as 33 to 35 also (Hagar *in* Bent, 1938: 50, 52). Fledged young have been seen near an eyrie on Mt. Desert Island on July 25 (Dietrich, 1938). In one instance on the coast, three adults stayed about an eyrie for three weeks in late September and early October (Norton). One brood is raised yearly.

Ecology. This is typically a bird of open spaces. Inland nesting sites are generally in the vicinity of a lake or several ponds, but in several instances, nests are found where the surrounding country is largely unbroken forest. This bird is not known to occur regularly in cities in Maine as yet. Transients along the coast have been seen to perch on rocks only a few feet above the surface of the sea.

Remarks. Probably less than ten pairs of Duck Hawks nest in Maine at present and it is doubtful that the population ever was a great deal larger in the past hundred years.

After a trip along the coast in the summer of 1907, Norton (1907d:

323) wrote: "The presence of the Peregrine Falcon at the Brothers [off Jonesport, Washington County] seemed to me sufficient reason to account for the abandonment of Libby Island [about 4½ miles from the Brothers] by the Terns. One of these birds took up its abode at the Egg Rocks, in Muscongus Bay, in 1901, and the Terns abandoned the place and their eggs. There I collected pellets filled with feathers and bones of Terns and Petrels." Since these petrels usually come into the bay only at night, to relieve mates on eggs in burrows, one wonders if the hawks pursued them by moonlight, after the manner of the larger gulls.

That eggs of this species were found in Maine as early as April 14, as stated in print several times, is traceable to Carpenter (1884a: 9), who mentioned a nest, not eggs, found on this date.

Eastern Pigeon Hawk

Falco columbarius columbarius Linnaeus

Transient, rather common in spring and common in fall on the coast, and rather common inland at both seasons; regularly uncommon in *summer,* noted chiefly in eastern counties (not known to breed); *winter resident,* records for Cumberland and Washington Counties.

Spring. Migration apparently begins about March 28, earlier records probably being for wintering birds. During his years at Seguin (1893–1907), Spinney noted migrants from April 15 to May 10. Although most birds are seen in April, some (sometimes several seen together) are noted on the coast well into May. Pettingill (1939a: 333) mentioned a flight at Machias Seal Island (Canadian territory), about May 15, 1935.

Fall. Apparently there is considerable wandering in August, for in this month, Pigeon Hawks have been observed at numerous places where they were not seen earlier in the summer. Whereas Spinney noted single birds at Seguin on August 10 and 13, 1898, most of his numerous records for this season fall between September 5 and 30; he generally saw several hundred in a season. Elsewhere, records to at least October 7 are for transients, and later ones probably for wintering birds.

Flight year. In *1903,* there was a large flight in September at Seguin (Spinney), and in 1906, an unusual scarcity in fall, which to Spinney (1906b: 101) indicated that the birds had "probably taken another direction of flight."

Summer. About six birds are reported seen each year, from May 24 to August 7. Where age has been noted, records have been for adults

except in a few instances. (See Remarks for discussion of alleged breeding.)

Winter. Six winter records for the Portland region were compiled by Norton (1910a). A few other occurrences in the same locality were published by N. C. Brown (1910 and 1911b), and there are several more recent ones for Cumberland County. Boardman (1903: 245) stated that he had shot this species in the St. Croix valley in winter, and Rich saw one on December 22, 1932, at Perry, Washington County.

Ecology. This hawk occurs at such diverse places in the state as offshore islands, extensive coniferous or mixed-growth forests, at higher elevations on mountains where trees are small, cultivated lands, and about cities. Most early summer records are for localities where coniferous trees are a prominent feature.

Spinney noted that transients generally accompanied a wave of smaller migrating birds at Seguin. Typical entries in his journal were: September 29, 1907, a large number of Pigeon Hawks with Flickers; April 18, 1898, many following a flight of Flickers and smaller birds; May 1, 1901, Pigeon Hawks and Flickers coming in from seaward.

Remarks. There is no unquestionable evidence of this hawk breeding in Maine, but it seems almost certain, from its summer occurrence, that the species does nest, even though rarely. Published statements that Maine was in the breeding range of the Pigeon Hawk go back to T. M. Brewer (1857: 13), who stated that the species bred as far south as Maine on the Atlantic coast. Boardman (1862: 122) wrote: "Resident. Not common. Breeds in hollow trees"—an obvious error. Later, in publication of a letter he wrote in 1874, Boardman (1903: 245) stated that he never had found a nest, that the species undoubtedly bred, and that it was not a very common hawk in the St. Croix valley. In a reprint of a list he first published in 1899 and 1900 (ibid. 308), the status of the Pigeon Hawk was given as: "Not uncommon; breeds on cliffs." The basis for this statement is unknown.

Knight (1908b: 245) cited county records which indicated that this hawk bred in at least several counties; he also wrote that "young birds have been seen which were unable to fly, evidently just out of the nest, and during June the parents have been observed in a great state of excitement though the nests could not be located. I have had them both swoop down at me, uttering an angry . . . [series of notes] and exhibit every indication of trying to protect a nest which could not be located." It is plain that Knight himself did not see young Pigeon Hawks; nor were there any in his collection which Norton purchased. His informant might have seen Sparrow Hawks, which have been mistaken for Pigeon Hawks more than once. Further, such behavior as birds showing concern when an area is invaded by a person is not

conclusive evidence of a nest being nearby. Bonaparte's Gull, which does not breed in the state, has been known to exhibit such behavior in Maine.

"Manuscript notes relating to Pigeon Hawks taken at Lake Umbagog and preserved in my collection remind me that I found in the stomach of a young male, shot on September 11, 1873, 'grasshoppers in large numbers' and nothing else; in that of a second specimen of the same sex and similar age, killed on September 19, 1873, 'grasshoppers and the remains of an adult male Goldfinch'; in that of a third . . . obtained on September 19, 1888, fragments of 'birds' that could not be determined specifically; in that of a fourth, taken on October 11, 1888, 'a Sparrow' which apparently was not identified" (Brewster, 1925: 361). Eight specimens, probably taken within 25 miles of Lincoln, Penobscot County, and chiefly "in the spring and autumn," had shown preferences for song birds, frequency of occurrence being: warblers in 2; sparrows in 2; a swallow in 1; unidentified passerine birds in 3, and insects in 1 (Mendall, 1944: 206).

In writing of his general impression of Pigeon Hawks and Flickers as observed on Seguin, Spinney (1904: 74) wrote: "Scores of goldenwing woodpeckers or flickers better known, are searching ant hills on the ground, while from some elevated perch a pigeon hawk . . . scans the field with ever watchful eye. The pigeon hawks invariably accompany the flickers [in migrations], but for what purpose I never could determine. I have watched them many times, when from their perch the time seemed ripe for them, dart at a flicker on the ground which is busily searching for its bill of fare. The flicker then would start for the nearest cover or higher ground, uttering as it flew a series of shrieks, . . but I never saw a hawk injure the flicker in any way, or pilfer any food to reward it for its trouble." Brewster (1925: 356) made a similar observation on September 19, 1888, at Lake Umbagog: "I saw a Pigeon Hawk chase a Flicker this morning, evidently without serious intent, for he turned back, after going only a few rods, and flew to a tall stub."

T. M. Brewer (1857: 13), in figuring an egg, alleged to be of this species, from the Grand Manan archipelago, stated that he was hesitant about its identity, and later (1867: 122) wrote that the egg actually had been that of another species.

Northern Sparrow Hawk

Falco sparverius sparverius Linnaeus

Summer resident, rather common throughout except on larger inshore islands where uncommon; *transient,* rather common in spring and com-

mon in fall throughout; *winter resident,* regularly uncommon in coastal counties.

Spring. The increasing number of records from March 19 on indicates that more than the wintering population generally is present after that date. Migration, most noticeable in the first three weeks of April, lasts into early May.

Fall. Gatherings are noted and migration has begun by August 25. On August 25, 1900, this bird was "abundant" near Portland (Norton); on August 29, 1940, twenty were seen in Township 36, Washington County (Eckstorm); and on August 30, 1901, this species was "very plentiful" near Portland (Norton). Most migrants are seen from September 9 to 17, almost all have left by September 28, and migration ends by about October 21.

Breeding. This hawk nests in a natural cavity in a tree, in a woodpecker (usually Flicker) hole, or in a nesting box of the proper size. On the early date of March 20, 1913, a female was seen inspecting tree cavities at Westbrook, Cumberland County, and birds had returned to known nesting sites by April 3, 1904, and April 6, 1933, near Portland (Norton). On May 4, 1926, a pair was observed at Buxton, York County; the female carried straw in her bill to the nesting tree where she passed it to the male who then took it into the cavity (Haven).

It is likely that eggs are laid from early May to early June (but see below). Three to five, usually four, eggs make a clutch. Egg dates in Maine are: May 30, 1863, five eggs taken in the St. Croix valley (Boardman, 1907: 96); June 1, 1891, five taken by Knight (1908b: 248), probably near Bangor; early June, 1885, four eggs taken at Lake Umbagog (Brewster, 1925: 363); and on June 21, 1913, three eggs in a nest at Holden, Penobscot County, which were slightly incubated when taken three days later (Eckstorm). In Iowa, incubation was found to require 28 and 29 days for different eggs in a clutch, and fledging about 25 or 26 days (Sherman, 1913: 408, 416). A brood of young was out of the nest on July 1, 1942, at Berwick, York County (A. Perkins), which would indicate laying by very early April. One brood is raised yearly.

Ecology. This is a bird of open fields, orchards, meadows, and clearings in the woods, the population being greater on land converted to agriculture. Its characteristic habit of hovering in the air when in search of food sets it apart from the Pigeon Hawk and is reminiscent of the Osprey. In migration, the Sparrow Hawk population is not much greater along the coast, as is the case with the Pigeon Hawk; the former feeds mainly on insects, and the latter follows the coastal concentration of smaller birds upon which it feeds.

Remarks. The Sparrow Hawk is the second hawk in point of numbers in Maine, the Broad-wing being more numerous.

Brewster (1925: 364) wrote: "To the best of my knowledge and belief the Sparrow Hawks of the Umbagog region are one and all guiltless of bird murder. I have found only grasshoppers in their stomachs and have never seen them stoop at anything save these or other insects, some of which are occasionally caught in the air, perhaps while flying at a considerable height, although most are picked up from the ground in grassy places."

Of 14 specimens taken from April to October, probably within 25 miles of Lincoln, Penobscot County, Mendall (1944: 202) reported the following frequency of occurrence: insects (chiefly grasshoppers) in 8; spiders in 6, frogs in 2, snakes in 2, mice in 1, and a sparrow in 1. Wintering birds have been known to kill English Sparrows in the Portland suburbs. Audubon (1834: 249) reported, on authority of Theodore Lincoln, that Sparrow Hawks attacked Cliff Swallows while the latter were on their eggs, the hawks actually tearing open the covered mud nests and seizing the occupants. This was at Dennysville, Washington County.

Samuels (1865: 389) reported four "newly laid" eggs of this hawk taken from a Crow's nest on June 11, 1864, in the Umbagog region. This is clearly erroneous as the Sparrow Hawk nests in cavities.

Family TETRAONIDAE

Capercailzie

Tetrao urogallus urogallus Linnaeus

Introduced, but not established. Four birds were liberated on March 29, 1896, at New Sweden, Aroostook County (Thomas, 1896). The birds were of Swedish stock. Cushnoc (1896), writing August 15 of that year, stated that they had vanished.

Black Grouse

Lyrurus tetrix tetrix Linnaeus

Introduced, but not established. Four females and three males, of Swedish stock, were liberated on March 29, 1896, at New Sweden, Aroostook County (Thomas, 1896). One was seen later in the spring, and one the following autumn, near the adjoining town of Caribou (Anon., 1896b). Allegedly they were heard calling after that (Grinnell, 1897), but this was the last heard of them.

Canada Spruce Grouse

Canachites canadensis canace (Linnaeus)

Resident, varying from rare to rather common (subject to fluctuations), in northern Oxford, upper half of Franklin and Somerset, most of Piscataquis, uncultivated parts of Aroostook, upper two thirds of Penobscot, northeastern Hancock, and northern half of Washington Counties.

Breeding. Nest data for Maine are: a nest, on a knoll under a small balsam tree near B Pond, Upton, Oxford County, was "made of small twigs, bark, moss, leaves and a few feathers of the bird herself" (Thayer, 1901); one, partially concealed, was sunk in *Sphagnum* at the base of a small spruce in a very small clearing in a dense black spruce bog near the north shore of Martin Pond in Township 17, Range 5, Aroostook County (Mendall); one, near Richardson Lake, Franklin County, was sunk "in the top of a little mound with no rock, log, or even tree-trunk" near it (Brewster, 1925: 285); and two nests, "simply hollows in the moss," were located "quite near each other, both under low spruces" (Hardy, 1910c: 49), the locality being unstated.

Various writers have overstated the clutch size of the Spruce Grouse. Rand (1947b) tabulated data from various parts of the species' range (most being from Nova Scotia) and showed that the normal size is four to seven, perhaps rarely less, and occasionally ten to 13. In Maine, clutches probably are laid in May, and a second laid if the first is destroyed. A set of 11 eggs in the collection of the Museum of Comparative Zoölogy, was "heavily incubated" when taken on May 25 in Nova Scotia, indicating that laying, in this instance, began by very early May.

Egg data for Maine are: one egg in the Upton nest, mentioned above, on May 13, 1901, three on the 15th, four on the 16th, none laid on the 17th (a rainy day), and the bird incubating six eggs when the set was taken on the 24th (Thayer, 1901); nine eggs "about the last of May" (Hardy, 1910c: 49); the Richardson Lake nest contained nine eggs when found on June 1, 1899 (Brewster, 1925: 285); a report of a nest containing five or six eggs, found by a river driver in early June in Oxford County (ibid. 284); a clutch of five indicated in the nest found by Mendall near Martin Pond; and a clutch, of six, incubation estimated at one week, taken June 14 of unstated year in Township 4, Range 11, Piscataquis County (W. Clayton).

Incubation probably requires about 24 days. Brewster (1925: 278) reported receiving, in early June of unstated year, at Lake Umbagog, a female "with one of her chicks which could not have been more than four or five days old." On June 22, 1875, a female with "newly hatched

young" was seen near Cathance Lake, which lies in Cooper and in Plantation 14, Washington County (Smith). When Mendall found the nest at Martin Pond on July 22, 1944, he figured, from the appearance of the nest and shells, that the four eggs (a fifth was infertile) had hatched shortly after July 1. On July 10, 1945, Weston saw five broods of chicks, some of which could fly, near Sourdnahunk Lake, Piscataquis County, and noted that the broods were small in numbers. On July 28, 1874, Brewster (1925: 279) saw, at Umbagog, a female with six young, "about as large as full-grown Bob-whites" and able to fly. The time required to reach flying age in this precocial species is unknown. One brood is raised yearly.

Ecology. Brewster's (ibid. 276-277) remarks on this bird at Lake Umbagog apply throughout the range of the bird in Maine: "For the most part the birds frequent dense, matted growths of cedar (*i. e.* arbor vitae), black spruce, and hackmatack (American larch), overspreading, low-lying, flat, and more or less swampy lands bordering on sluggish streams or on semiopen bogs similar to those known as Muskegs in the far North. From such coverts they wander not infrequently up neighboring hillsides to evergreen forests on still higher ground beyond, or perhaps into neglected pastures choked with intermingling young balsams, red spruces, and white spruces no more than eight or ten feet tall. Nor are they unknown to appear well out in rather wide upland clearings, where the only available cover consists of raspberry bushes, or even river- or brook-meadows, where it is furnished solely by rank grass. Ramblings, thus venturesome, are exceptional, of course, and undertaken I believe, at no seasons other than late summer or early autumn, when the lowly vegetation that clothes such perfectly treeless ground is most luxuriant, and also best supplied with berries or insects of various kinds; these Spruce Partridges devour eagerly whenever, and wherever, they can obtain them readily, although subsisting during the greater part of the year on a nearly unmixed diet of spruce and balsam spills [leaves], plucked mostly from branches at least fifteen or twenty feet above the ground."

Hardy (*in* Bendire, 1892: 53) wrote: "They feed almost entirely on the needles of spruce and fir, also hackmatack and berries in summer. They show a preference for some fir trees over others, as I have seen them return to the same tree until it was nearly stripped. When disturbed, they always take to the trees, walking about in them, from one branch to another. . . When on the ground they scratch a great deal more than other Grouse do."

In summary, it should be noted that this grouse does not dwell the year round in dense coniferous growth, but shows some preference—especially in summer—for borders or edges, or where areas of spruce

and tamarack adjoin open bogs and heaths. In late summer the birds often feed in even more open parts of this habitat, and on higher and drier ground, where insects and berries are plentiful. The species is more arboreal than the Ruffed Grouse. There are records of occurrence up to 3,400 feet altitude on Mt. Katahdin (Palmer and Taber, 1946: 305).

Remarks. The Spruce Grouse formerly occupied all of Maine except perhaps most of York and parts of western Cumberland Counties. It is known to have been on the larger wooded islands. In 1876, it was still present in some numbers on Roque Island, off Jonesport, Washington County (Longfellow, 1876). The last island record is perhaps that of the one seen on Mt. Desert Island on August 29, 1899 (Hallock, 1899). A straggler was taken near Portland in the fall of 1868 (J. A. Allen, 1870: 638), and a male at St. George, Knox County, in the early 1880's (Norton). The species was nearly exterminated around settled places rather early. Hardy and his daughter, Mrs. F. H. Eckstorm, noted eight occurrences for the Bangor-Brewer-Holden region from about 1850 to 1913, the two latest being for November, 1888, when one bird killed itself by flying against a house in Bangor, and in the fall of 1913, Paul Eckstorm caught a young male in a mink trap at Holden.

Hardy (*in* Bendire, 1892: 53) wrote: "I have been over every part of this State where this bird is likely to be abundant, east from Penobscot, from the sea to the North Corner Monument, but I have always found the Canada Grouse very scarce everywhere. Five once and six at another time are the largest number I ever saw together. I have many times traveled a month, and sometimes two months constantly in the woods, where they ought to be, without seeing over one or two." Later, Hardy (1910c: 47) pointed out that, in his travels in the Maine woods for over 60 years, he had seen only about 50 birds, nearly one-third of which he had found "on a space not over six miles square, between the head waters of the Passadumkeag and Machias, when visiting it at intervals during some twenty years." He stated further that the bird was "fast decreasing," one reason being that so many persons visiting the woods killed anything they saw.

The numbers of this species fluctuate drastically, as is the case with the Ruffed Grouse. At Upton, more Spruce Grouse were seen in 1890 than in any year since 1876 (C. B. S., 1890). This agrees with Brewster's statement (1925: 285) for the same region: "In 1889 they were more abundant than I have ever known them to be before or since. In 1897 only a few were reported." A recent record for central Oxford County is for a single bird seen on September 23, 1941, at Rumford Center (Mrs. C. A. Poole). There are no good data on

fluctuations for any other Maine locality, although reports in 1947 indicated that the population was perhaps near a peak in numbers in Somerset and Piscataquis Counties. High numbers there also were noted in 1948.

Not only does this grouse fluctuate in numbers, but the over-all picture is one of a decreasing population in a range that has diminished in size. Two factors involved in this general decline are the smallness of broods and the notable unwariness of the species. Clutches are smaller than in the Ruffed Grouse. From the few data given above on broods, and from what I have learned from trappers and guides, it appears that broods seldom contain more than four to six chicks. So unwary are the birds that they can be caught by the neck with a noose at the end of a pole. Brewster (1925: 278) discussed this practice at Umbagog.

Beginning in 1915 the Spruce Grouse was protected by law except during an open season corresponding with that of the Ruffed Grouse (Norton, 1915b: 501). Its general decrease has been so steady, however, that Aldous and Mendall (1940: 9) urged that "a strict closed season," effective immediately, be put on "this vanishing species."

In addition to what has been reported under Ecology about food, the following data are of interest. Brewster (1925) reported these observations at Umbagog: a young bird, shot August 28, 1874, had its crop full of hackmatack needles; a female, watched on May 24, 1879, was in a red spruce tree, eating the needles; three young, found at a grassy place and shot on September 11, 1888, had eaten "very many grasshoppers of various kinds and sizes, numerous ripe raspberries, a few leaves of *Spiraea tomentosa* and (in one crop only) a few larch spills"; two, about half grown and killed in a bog on August 13, 1873, had eaten "raspberries, blueberries, checkerberries, and balsam *buds* as well as needles"; an adult female, shot on September 28, 1890, had eaten "fifty-one berries of *Viburnum lentago*?, some fragments of small mushrooms, and a few spills of the black spruce," and a young male in company with her, had eaten "thirteen Viburnum berries, uncounted pieces of mushrooms, and a few larch spills." Hardy (1910c: 48–49), reporting a male feeding in a spruce tree in a clearing, wrote: "He was in no haste and would often stop picking for a while. I should judge that he was there at least half an hour. . . It was evident that he had resorted to this tree for food for some time, as so many needles had been picked off that the foliage looked as thin as a juniper's does after the worms have eaten part of the needles."

In Nova Scotia, tops of young spruces were placed in a large cage containing Spruce Grouse. "In gathering these spines from the twigs the bird makes a stroke nearly parallel with the branch on which they

grow, striking outward towards the end of the limb, gathering perhaps a half dozen leaves at a time. Then by a twisting movement of the head, the spines are partly broken and partly bitten off, leaving a small portion still in place on the twig. These movements are as rapid as a domestic fowl picking up corn" (Watson Bishop, 1914: 151).

Two partially albino females have been taken, one at Houlton, Aroostook County (Deane, 1879a: 29), and the other recorded without locality (Hardy, 1910c: 49).

Hardy twice (*in* Bendire, 1892: 53; 1910c: 48) stated that males were greatly in excess of females in the Spruce Grouse population in the state. He may have been right, but it would seem more likely that males are noted more frequently because of their greater conspicuousness. Birds of both sexes are overlooked easily, however, for they will stand motionless when approached and one can pass by within a few feet without suspecting their presence.

Persons interested in Maine accounts of the drumming and display of this species, which differs in numerous ways from that of the Ruffed Grouse, should consult J. G. Rich (1879), Penobscot (1878 and 1883), and Brewster (1925: 282–283). Rich mentioned drumming in early autumn.

In former years, when this bird was more plentiful in Hancock, Washington, and Aroostook Counties, it resorted regularly to the edges of heaths or barrens in late summer. The name for such places in those parts was pronounced "haith" and the Spruce Grouse was called, quite naturally, the "Haith" or "Heath" Hen.

Uttall (1939) referred a specimen from Calais to his proposed new race, *torridus*. I agree with Rand (1948) in not considering this a valid race.

Canada Ruffed Grouse

Bonasa umbellus togata (Linnaeus)

Resident, varying from uncommon to very common (subject to fluctuations), throughout, including larger inshore islands.

Breeding. The nest is a mere depression in the ground, often beside a stump or fallen log, but sometimes in a very exposed and unshaded site. A few leaves are added before laying, and the nest-building instinct persists well into incubation. Laying may begin as early as April 20, but occurs more commonly the first week in May. On May 2, 1921, a nest with 13 eggs was found at Turner, Androscoggin County (Mrs. C. A. Poole). Several nests containing six, eight, and even 11 eggs have been found by May 4. Most clutches are completed by May 15, and later ones are probably second layings after the first were destroyed.

"Of the Ruffed Grouse nests, about 40, that I have seen in Maine, the eggs varied in number from six to 13. I am not sure the set of six was complete as it was destroyed later. I do have a record of one complete at seven. The average size of the whole series was 11 eggs per nest" (Gross). A nest with 15 eggs was found on May 21, 1881, at Bucksport, Hancock County, by Buker (1881a). On the late date of August 5, 1917, a grouse was found on a nest containing 18 eggs at Scarborough (Smith). This may have been the result of two birds laying in the same nest. A newspaper report, cited by Anon. (1884), mentioned a grouse and a domestic fowl laying in the same nest in a pasture at Damariscotta, Lincoln County, there being 12 grouse eggs and eight hen eggs, with both birds incubating at the same time.

Incubation, by the female, requires 24 days. Brewster (1925: 302) believed that, although the male might copulate with more than one female in a season, he "lays claim to only one" and "may continue to be rather attentive to her while she is sitting on her eggs, besides sharing with her to some extent the care of the young for a week or two after they have left the nest which happens, of course, almost as soon as they are hatched." The young have partly grown flight feathers and are capable of making short flights when they are less than a quarter the size of adults, and still partly in yellowish natal down. The earliest record at hand for a brood of flying young is Norton's for June 17, 1893, at Westbrook, Cumberland County. One brood is raised yearly.

Ecology. The Ruffed Grouse is primarily a bird of dry woodlands of mixed growth. The characteristic habitat is composed of second-growth trees and open clearings. Old fields and orchards often are visited for feeding, and conifers are sought mainly for shelter. In late fall, horn-like fringes, which are modified scales, grow from the sides of the toes, and facilitate traveling in the snow. For this reason, they are called 'snowshoes.' They are shed in April. Sometimes the grouse dive into soft snow for shelter and occasionally are buried there when a crust forms on the surface. Locke (1886) and several others have reported finding birds that had perished, probably from starvation, when imprisoned under a crust of frozen snow. The Ruffed Grouse is somewhat gregarious except during the breeding season.

Fluctuations. This grouse is subject to great fluctuations. Near centers of human population in much of southern Maine, a decreasing number of birds is involved in both the maxima and minima of these fluctuations. Although data are far from satisfactory, there is evidence indicating that population peaks occurred about as follows, with those years starred in which peaks seem to have been limited to part of the state: 1874, about 1881, about 1888, 1893 or 1894, 1905, about 1915, 1923, 1929 or soon after, *1939, *1943, approaching a peak in *1947.

The lowest numbers, listed in the same fashion, occurred in: 1876, *1882, 1896, and poor recovery before a drop in 1902, 1907, 1918, about 1924, *1938, about 1944 in northern and 1945 in eastern Maine. This list of peaks and low points, superseding an earlier one (Palmer, 1948), is based on the information in the following five paragraphs.

In 1873, grouse were notably plentiful in the vicinity of Portland (F., 1873), and in late 1874, were at a high level in that region (Mac., 1874) and in the Calais region (Boardman, 1874a). A low point in Franklin County in the winter of 1876–77 was blamed on "winter killing" by F. C. Barker (1879), who reported that they were recovering in 1879. The population was high in the northern half of the state in late 1880 (Fitch, 1880; E. M. G., 1880). There was good shooting in Franklin County in 1881, and many birds reportedly survived the winter of 1881–82 there (J. W. T., 1882). In 1882, they were scarce about Portland, in the Rangeley region of Franklin County, and in the Moosehead region (Austin, 1885: 487). In the fall of 1884 they were scarce in northern Maine and in Washington County, but plentiful in southern Maine, according to Special (1884), but other reports for this year were somewhat at variance with this one. Carpenter (1886b: 178), for example, reported that the species was common in the Dead River region of Franklin County where he visited in the years 1883, 1884, and 1885. Grouse were plentiful in Oxford County in late 1888 (J. G. Rich, 1888), and in the fall of 1893 (J. G. Rich, 1893b). In the fall of 1894, they were plentiful in Aroostook County (LaRue, 1894). For the fall of 1896, Hardy (1896a) wrote: "In over fifty years of gunning I have never known ruffed grouse so scarce over so large a part of our state." Hardy was acquainted particularly with the Penobscot drainage and all of Maine east and north of it. Grouse were very scarce in the Moosehead region in 1896 (N. F. Tufts, 1897), and in Waldo County in 1897 (Anon., 1898a). Various reports indicated an unusually slow recovery after the major 1896 slump. Very low numbers continued to at least the summer of 1899, when Hardy (1899b) saw few birds. On Mt. Desert Island, however, Hallock (1899) reported that grouse were plentiful in the summer of 1899.

By 1901, there were conflicting reports, indicating local recovery and large areas remaining where grouse continued to be scarce. In 1902, they were scarce at Readfield, Kennebec County (E. A. M., 1902), and at Cornish, York County (Templar, 1903). A high level of numbers was reached in 1905 in southwestern Maine (Walter Rich, 1907b: 91), but dropped in 1906 and went still lower in 1907. This decrease was widespread. Grouse were scarce at Brewer in late 1907 (E. Gross, 1908). In 1908 the population was reported as increasing

at Rockland, Knox County (Wight, 1908), but in the winter of 1908–09 they were reported "to be found in shockingly diminished numbers" at Cornish (Woodbury, 1909).

Published data for subsequent years are meager, although there are unpublished reports from quite a few persons. The species was scarce in Cumberland County in 1916 (Norton), but the lowest point over much of the state, including southwestern Maine, was reached in 1918 (various observers). Fair recovery was noted by 1922 (Norton, 1922b: 410). The next peak apparently came in 1923 before the population had recovered greatly, and was followed in 1924 or 1925 by another drop. The next data are from questionnaires returned to A. O. Gross (1930: 8), which added up as follows: in 1927, thirteen reports of scarce and 20 of normal or plentiful; in 1928, ten of scarce, eight of normal, and 24 of plentiful; in 1929, five of scarce, three of normal, and 43 of plentiful. This would indicate a peak or an approach to one in 1929, but data are lacking for the next few years.

There was a scarcity in Cumberland and Aroostook Counties in 1937 (Norton), and in Penobscot County from 1936 to 1938, according to Mendall, who also supplied the following data. There was a high population in central Penobscot County (and in much of northern Maine) from 1941 to 1943, and a gradual decline in central Penobscot County after the latter year. Meanwhile, in Washington and Hancock Counties, there was a high population in 1938 and 1939, followed by a great decline in 1940, then a gradual one, reaching a low point in 1945, and some recovery since. From inadequate data it appears that grouse in western and southern Maine were approaching a population peak in 1947.

The cause or causes of these violent fluctuations in numbers are not understood. The various studies of the diseases and parasites of the species have not shed much light on the problem.

Remarks. A great many grouse formerly were snared and shipped out of the state for sale to hotels. Wheeler (1883) stated that, a few years earlier, he had seen "some five hundred" grouse stored at one time in a back room in a village store, awaiting shipment, and that not one of these had been killed with a gun. Another report (Anon., 1883) mentioned a barrel, marked "potatoes," and a trunk both full of grouse shipped to Boston. Numerous other reports of this nature have appeared in print. Anyone who doubts that large numbers of grouse could be shot easily in former years should read Brewster's (1925: 288–292) account of hunting them at Lake Umbagog. In one instance he shot six birds (an entire covey) and none flew during the shooting and were, in fact, but slightly disturbed as one after another was killed.

Some statistics on the number of grouse shot, in former years, are as

follows: 60 birds shot by two men, from a buggy, riding from Bangor to Moosehead Lake (Thoreau, 1864: 88); 427 shot by Loring, mostly in Cumberland County, from 1842 to 1854, 240 shot by Rogers, in the same region, from 1865 to 1902, and 313 shot by Pillsbury, from 1891 to 1912; "at least fifty" annually shot by Hardy (1910b), or a total of about 2,000 for the years when he made trips to the woods; 125 birds reportedly shot by one person in the fall of 1883, at Norway, Oxford County (Jeems, 1884); and 41 shot by 69 men, in a side hunt, on October 31, 1890, at Farmington, Franklin County (Flyrnt, 1890).

The food habits of the Ruffed Grouse have been studied extensively in Maine. Since there is not space to discuss this matter here, the reader is referred especially to Hardy (*in* Bendire, 1892: 66), Brewster (1925: 293–294), Gross (1928b: 4–7)—which is not confined to Maine birds, Kittams (1943), and C. P. Brown (1946). The last is especially valuable because it lists food by seasons and by types of habitat. In former years, and in years when grouse were numerous, the birds reportedly did some damage by eating the buds of apple trees. Baird, Brewer, and Ridgway (1874, 3: 452) reported grouse, in Maine, "thus occasionally causing a serious injury to the prospective harvest."

Self tamed grouse have been reported occasionally for many years. Such a bird near Brunswick, Cumberland County, while being photographed, would come so close to the photographer that the man was obliged to hold the bird off with his foot, and, as a consequence, some of the pictures showed not only the grouse but also the shoe of the photographer. Such birds, if confined, seldom live more than a few weeks.

There are only a few instances where grouse have been liberated for restocking an area. One of these was in 1874 when a few were placed on Roque Island, off Jonesport, Washington County; they were reported increasing in numbers two years later (Longfellow, 1876).

Although the typical race *umbellus* often has been recorded as occurring in Maine, such reports are erroneous and based on the fact that, in some localities, brown-phase birds are more numerous than gray ones. The former are decidedly more numerous in southwestern counties. A few birds can hardly be called brown as they really are reddish or copper colored. On December 20, 1885, Hardy killed a male grouse in Penobscot County which was copper colored, including even the ruffs and subterminal tail band. The specimen was mutilated too badly to be saved, but the ruffs and tail were sent to William Brewster. Most albinistic specimens are of a light tan color and show faint markings, rather than exhibiting true albinism. Hardy (1884) long ago noted that there is variation in the number of tail feathers in this species. Males usually have 20 and females 16, but there is variation in both sexes.

On the average, male grouse are larger and heavier than females. Some figures, based mostly on New England birds, were given by Gross (1928b: 7–8) as follows: a hundred males averaged 20.81 ounces, a hundred females, 17.92; males averaged 17.7 inches in length, and females 16.0. The heaviest bird, a male, weighed 25.64 ounces, and (as stated in another paper) came from Acadia National Park on Mt. Desert Island. Hardy (1910b), who had weighed a great many of the approximate 2,000 grouse he had shot, gave 31 and 32 ounces as the heaviest weights he had noted, and 22 and 23¼ inches as the greatest lengths.

The drumming of the cock grouse is a well known sound to most persons. This is done mostly in spring, and again for a period during warm days in early fall. It may occur during warm weather at any time; Hardy (*in* Bendire, 1892: 66) stated that he had heard grouse drumming every month in the year.

Formerly there was a superstition in parts of Maine that if a grouse came to a house where there was a sick person, and the bird was killed and a broth made for the sick person, a cure would be effected immediately.

"The *Partridge* is larger than ours, white flesht, but very dry, they are indeed a sort of *Partridges* called *Grooses*" (Josselyn, 1674; 1865b: 78).

Many questionable statements have been made regarding this bird in Maine. For example, Samuels (1867: 390) mentioned eggs which a collector declared were found in a Crow's nest in a tall pine, and Hardy (1905) reported seeing a cock bird in charge of a brood.

Canadian Willow Ptarmigan

Lagopus lagopus albus (Gmelin)

One record. A male in winter plumage was shot on April 23, 1892, at Kenduskeag, Penobscot County, and acquired by Harry Merrill of Bangor (Webster, 1892a; Merrill, 1892b).

Remarks. Audubon (1834: 528) mentioned this bird as occurring in Maine. No doubt this report, generally believed to be erroneous, furnished the basis for inclusion of this bird in the Maine fauna by Dekay in 1844, Hitchbock in 1862, Verrill in 1862, and Coues in 1868. Smith (1882–83: 224) wrote: "Mr. Audubon has stated that he 'felt assured it exists in Maine . . .' And further states that 'Theodore Lincoln, Esq., of Dennysville, in Maine, shot seven one day, not many miles from that village.' In regard to these statements, Mr. Lincoln has informed me that he could not remember ever finding the ptarmi-

gan in Maine, and that 'probably Mr. Audubon referred to those shot further North.'

"Mr. Lincoln speaks of the Canada Grouse . . . as 'spotted grouse,' and it is my belief that the incident of the seven birds shot in one day near Dennysville, Me., related by Mr. Audubon, was probably referable to the 'spotted' or Canada grouse."

Heath Hen

Tympanuchus cupido cupido (Linnaeus)

An *extinct* bird whose occurrence as far north as Maine is *hypothetical.*

This bird was listed for Maine first by Bonaparte (1826: 127) in his *Synopsis* without giving any particulars as to locality or basis for its inclusion in the recorded fauna of the state. In his researches into the history of this bird, Gross (1928a: 495–496) was unable to find data either to substantiate or discredit Bonaparte's report. Audubon (1834: 492) mentioned this bird as occurring on Mt. Desert Island and on a certain barren tract "lying not far from the famed Mar's Hill" in Aroostook County. No record of introduction of game birds is known for that period. A bird occurring about the edges of 'heaths' or 'barrens' in eastern Maine, and locally known as "Heath Hen," was the Spruce Grouse. All writers' inclusion of Maine in the range of the Heath Hen, from DeKay (1844) on, appear to be based on Audubon.

The scrub oak of York, northwestern Cumberland, and southern Oxford Counties may have been suitable habitat for the Heath Hen, but no evidence that it ever occurred there is known to exist.

Prairie Chicken

Tympanuchus cupido subsp.

Introduced but not established. There is mention of protection of "Pinnated Grouse" in Acts and Resolves of the 55th (1876) and 57th (1878) Maine Legislatures.

"We understand that in Maine a lot of pinnated grouse were turned out a few years ago and protected by a three or four years close season. Contrary to the predictions expressed by many people these birds flourished and increased, and this autumn, we are told, one gentleman killed thirty or forty of them. There seems to be no doubt that the pinnated grouse might do almost as well anywhere on the Atlantic coast. But they must be protected for a while" (Grinnell, 1888).

Remarks. I have little doubt that an introduction was tried, but Grinnell's report probably was exaggerated unintentionally. A decade later, Hardy (1898), who was inclined to make positive statements without too much knowledge of the facts, wrote as follows in criticizing the game laws: "There is no record of a pinnated grouse having ever been taken in Maine. There is a law against shooting them, passed through the ignorance of our legislators, but the bird has never been taken in Maine."

Family PHASIANIDAE

Red-legged Partridge

Alectoris graeca subsp.

Recently *introduced* at one locality and *maintained by human aid.* In a letter of March 28, 1947, Mr. George Stobie, Commissioner of Inland Fisheries and Game, stated that Mr. Guy Gannett had liberated some of these birds "at his summer home at Moosehead Lake." It was Stobie's belief that the birds never left the place, but stayed close by to be fed.

Common Partridge

Perdix perdix perdix (Linnaeus)

Introduced, but not permanently established.

Records. Fifty pairs were secured by the Cumberland County Fish and Game Protective Association and liberated at the following points near Portland in 1909: 18 pairs at Falmouth, 12 at Deering Center, 12 at Cape Elizabeth, and eight at Scarborough. At the last two places the birds survived and bred successfully until 1912 or later. In the Portland Society of Natural History are skins of two small chicks. These came from Scarborough, one having hatched on July 17, the other on the 22nd, in 1922, and were skinned by Ruthven Deane. In 1913, nineteen pairs were liberated about Portland and an equal number on Mt. Desert Island. The winters of 1917 and 1920 were seasons of exceptionally heavy snowfalls and, as a result, the number of these birds was steadily depleted. A few were reported at Cape Elizabeth as late as 1925. The history of the Mt. Desert birds, as reported in the *Kennebec Journal* (Feb. 6, 1925), is parallel to that of the others.

On April 15, 1942, Mendall, acting for the Department of Inland Fisheries and Game, liberated 15 males and 14 females at Fort Fair-

field, Aroostook County. Several were seen throughout the following summer and autumn. A single bird was seen on January 31, 1943, in an alder swale near the point of release. In February, during a period of severe cold and deep snows, one came into a farmyard about a mile from the point of release; it remained in the vicinity for over a week, during which time it often went into a barn, and when caught, was found to be in good flesh and flew readily upon being released; it disappeared when the weather became milder. These facts were supplied by Mendall.

Remarks. On June 2, 1917, a resident of Cape Elizabeth told Norton that this partridge had been very destructive to young crops there, especially peas and cabbages. This is not surprising in view of its known liking for green food in spring in parts of its normal range.

European Migratory Quail

Coturnix coturnix coturnix (Linnaeus)

Introduced, but not permanently established.

Records. Birds were imported from Italy and released in Maine and in New Brunswick, 100 being liberated in 1879 and 2,600 in 1880. Purchased by private subscription, the birds were liberated, in lots ranging from 15 to 75, at the following places: Kennebunk and Saco in York County, near Portland, Brunswick, and Bridgton in Cumberland County, Bath, Richmond, and Bowdoinham in Sagadahoc County, Auburn and Lewiston in Androscoggin County, Norway in Oxford County, Augusta in Kennebec County, Wiscassett in Lincoln County, Rockland in Knox County, Winterport in Waldo County, Bangor in Penobscot County, and at St. Stephen, New Brunswick. They were reported to have nested well in widely separated sections (Smith, 1880a). The few reported present in 1881, however, probably were wanderers from an introduction of 125 made that year by James Wight (1888) near Rockland.

There is a rather inconclusive report of a few birds, said to have been of this species, in York and Cumberland Counties in 1886 (in *Portland Press*, Nov. 13, 1886, from *Kennebunk Star*).

Remarks. Full accounts of the attempts to establish this bird in Maine have been printed by Smith and Wight, cited above, also by Smith (1880b: 36–41; 1882a; 1882–83: 44).

In Italy a southerly fall migration takes these birds over open water to their winter range in Africa. Failure of the experiments in Maine was attributed by some people (on no factual data) to a persistence of this migratory instinct which, considering the geography of the state, would have resulted in exhaustion and death of the birds at sea.

Bob-white

Colinus virginianus subsp.

Occasional *invader* (and *resident*) in southwestern parts of the state, and has been *introduced* at various places, but *never permanently established* in Maine.

Breeding. No nesting data for wild birds are at hand, but when resident for a period it may nest rarely. For southern New England, Forbush (1927: 4) wrote that the nest usually was a hollow lined with some grass or other vegetable material, usually concealed in grass or a brushy place, that 10 to 17 eggs usually were laid from late May to autumn and incubated 23 to 24 days, mainly by the female. One brood is raised yearly.

History. Contrary to statements made by G. M. Allen (1909: 90), Forbush (1910: 255; 1912: 368; 1927: 4), Aldrich (1946: 498), and others, this bird never was common or permanent in Maine. Indeed, discerning early writers mentioned it as possibly very rare or unknown to them. Baird, Brewer, and Ridgway (1874, 3: 470) admitted the species to the fauna of Maine, but only provisionally. A careful student, H. A. Purdie (1877: 15) found no positive evidence of the bird's occurrence in the state.

At various times the Bob-white has been brought into the state in small numbers. These introductions were made by individual enthusiasts, without such concerted action as attended the efforts to establish the Common Partridge, the Migratory Quail, and the Pheasant. The liberated birds persisted for a season or two in their new environment, but could not survive the winters of heavy snowfall. Among all records of occurrence of this bird, it is impossible to distinguish between natural invaders, believed to be occasional, and introduced birds and their progeny.

James Wight (1881) reported that four pairs, liberated at Vinalhaven, Knox County, in 1880, had bred, and, he hoped, with human aid, would survive the winter. Everett Smith (1882–83: 44) reported that several unsuccessful efforts to establish the species had been made in Maine prior to 1883. When two birds were shot at Morrill's Corner, near Portland, in late October, 1886, their occurrence there was regarded as a hopeful sign (in *Portland Daily Press*, Oct. 30, 1886). N. C. Brown pointed out, however, that just prior to this occasion, several liberations had been made in the vicinity.

Another introduction was made in Cumberland County in 1887, according to Smith (1887), who stated that some were being wintered in barns and others outdoors. That same winter a local newspaper reported that "about twenty were seen near the Two Lights on Cape

Elizabeth." In Penobscot County, "some were let loose in Hermon" in 1894, where they were reported as breeding for "several seasons, but when not tended through the winter, they all perished" (Knight, 1908b: 196). Either there was an earlier introduction in the vicinity of Hermon or Knight gave the wrong date, for on January 10, 1887, Mrs. F. H. Eckstorm noted in her daily journal: "I just saw a quail (*C. virginianus*) which was picked up frozen in Hermon. Eight more were seen flying."

Several times during the summer of 1896, Everett Johnson saw a Bob-white near East Hebron in southwestern Oxford County (Knight, 1898c). Mead (1901: 19) reported one heard calling at North Bridgton in northern Cumberland County, about 20 miles west southwest of East Hebron, in June, 1896.

In the spring of 1897, six birds were liberated on Maneskootuk, an island in Rangeley Lake, Franklin County (Dickson, 1898). Some bred there and were seen as late as April 15, 1898. One was seen at Auburn, Androscoggin County, in the spring of 1897 (Norton). Mead (1901: 19) reported one heard on June 18, 1897, and saw one on July 6, at North Bridgton. Mr. H. P. Libby reported that a Bob-white was seen during June and July, and about a dozen in October, 1897, at Eliot, York County (Knight, 1898c).

In 1898, twelve birds were brought from Pennsylvania and liberated on Jewell's Island in Casco Bay. Some of them remained on the island and, with human aid, wintered there. They were seen in the following spring by Swain (1904d).

In September of 1899, a male was reported seen and heard in Unity, Waldo County (Soule, 1902). It probably was a member or descendant of those liberated at Hermon.

During the summer of 1901, one was heard at Westbrook, Cumberland County (W. Hadlock). The location was only 12 miles from Jewell's Island. In 1902, one was heard again in Westbrook on July 19 and 22 (Norton). That fall, a taxidermist, John Lord, received eight birds shot in the vicinity of Portland. It is probable that all these birds were from the Jewell's Island stock.

It appears that an invasion from the southwest was taking place during the latter 1890's, but the severe winter of 1903–04 exterminated most of these birds. The occurrence at Eliot, mentioned above, very likely was a part of this invasion. Noble (1904c) reported the occurrence of this species at several places in southwestern Maine in the fall of 1902, and even more in 1903. He later (1904f) referred to the subject and mentioned that a "small flock" perished during the winter of 1903–04 at Kennebunk, York County. A mounted specimen from the collection of W. A. Barry of Kennebunk, now in the collection of the Portland Society of Natural History, may be one of these birds.

In 1903, a small flock was observed by I. W. and E. B. Pillsbury, at Old Orchard, York County. They refrained from shooting the birds, hoping for an increase in numbers in another year, but the birds perished that same severe season. A single bird, reported heard on June 24, 1904, at Westbrook, about 12 miles from Old Orchard, may have been a survivor (Norton).

The Bob-white seems to have been absent from Maine for many years after 1904. One was heard calling in the summer of 1930, near Eliot (R. Brooks). In 1932, "after many years of absence this bird appeared in Berwick," York County, where a "flock" was seen, and in 1933, one was heard at the same locality (A. Perkins, 1935). In January of 1934, a male was seen at Windham, Cumberland County, by two reliable observers (Norton). One was heard in Berwick in late July, 1942 (A. Perkins).

Remarks. I have not used a trinomial scientific name for the Bob-white since those occurring in the state are either native northeastern stock or introduced birds or hybrids of these.

Josselyn (1672; 1865a: 47) stated that there were no quails in New England. Whether this keen Englishman would have recognized our Bob-white as "quail," and whether he referred to Scarborough only (where he lived for some years), or to Massachusetts (where he visited), are points of conjecture.

Pheasant

Phasianus colchicus Linnaeus

Resident, having spread to Maine from birds introduced into Massachusetts, *introduced* into at least eleven Maine counties, and *restocked annually* in various places; *dependent on man for survival* during severe winters.

Breeding. Data from outside of Maine indicate that five to 20 (usually about 12) eggs are laid in a shallow, poorly constructed nest made in a depression in the ground by the hen. Incubation, by the hen, begins when the clutch is completed and requires 23 to 25 days. The young fly when shortly under two weeks of age. They accompany the hen for about two months, the cock rarely joining the family during the earlier part of this period. Adult weight is attained in about 20 weeks. One brood is raised yearly.

Ecology. The Pheasant is a farmland bird, seeking cover in thickets, copses, swamps, hedges, patches of tall weeds, and small groves of trees where there is undergrowth. Many nests are in grassy situations, such as hayfields, and here face the hazard of being disturbed by early mowing. Suitable spots for dust baths are resorted to often. In late

winter and spring the birds are forced into the open a great deal in order to secure food and are then particularly vulnerable to certain predators. If snows are deep, it is necessary to provide food for them that they may survive (Aldous and Mendall, 1940: 11). On December 7, 1940, when there was a foot of snow on the ground, a cock was observed eating frozen apples in a tree at Orrington, Penobscot County (Eckstorm).

History. Following the liberation of Pheasants in Massachusetts in 1894, stragglers were reported in New Hampshire and occasionally about Kittery in York County. Soon they were reported regularly at the latter place. A cock bird, mistaken for a hawk, was shot on November 5, 1912, in a Portland suburb. It was thought to have been a straggler from York County. From that time on, there were frequent reports of Pheasants in the Portland region. In the summer of 1918, these birds were rather numerous at Kittery and somewhat troublesome to gardeners in that vicinity. In the Portland region, birds are known to have nested as early as 1921.

The first liberation in Maine for which I have data occurred in 1897. A few were liberated by C. F. Gordon at Searsport, Waldo County, and were said to have hatched 12 young that year (Rowe, 1897). The same spring, four were liberated on Maneskootuk Island in Rangeley Lake, Franklin County; they hatched young, but the season was unusually wet and all were thought to have died (Dickson, 1898).

In 1930, the E. I. DuPont Company distributed Pheasant eggs to anyone wishing to hatch, raise, and liberate the birds. Nearly 2,000 eggs were distributed in the vicinity of Portland, and others elsewhere in the state. Although the hatchability of the eggs was poor, several hundred birds were raised and liberated in Cumberland County and elsewhere. By 1931, birds had been liberated in coastal counties as far east as Calais, as well as at inland points. According to newspaper reports, the state Department of Inland Fisheries and Game collaborated with local sportsmen in the work of distributing and liberating the birds.

Starting with 185 Pheasants in the spring of 1933, the state game farm at Dry Mills, Cumberland County, reportedly had raised and liberated 9,000 Pheasants by late 1935, in southern counties. There was a four-day open season, November 11 to 15, 1938, in all or parts of Cumberland, Kennebec, Lincoln, Sagadahoc, Waldo, and York Counties. The bag limit was two per day and four per season. A newspaper report gave an "estimated" 3,000 birds shot. The Pheasant was introduced on Monhegan in the late 1930's and subsequently nested there (W. Taylor).

Short open seasons have continued. At least 9,000 birds were

reported to have been liberated in 11 counties in 1941. On March 28, 1947, Mr. George Stobie, Commissioner of Inland Fisheries and Game, stated in a letter that 6,000 to 9,000 birds were being released annually, the purpose of such releases being to reduce hunting pressure on the Ruffed Grouse, which, he believed, was being accomplished. All birds released to 1945 were banded and the shooting of many unbanded birds indicated considerable natural reproduction, he stated. According to press statements, over 15,000 Pheasants were liberated in the state in 1947. Although formerly birds were released as far north as several Aroostook County localities, they now are liberated mainly in coastal areas.

Family MELEAGRIDIDAE

Eastern Turkey

Meleagris gallopavo silvestris Vieillot

Extirpated; in colonial times, a resident in York and parts of Oxford and Cumberland Counties.

History. Although Champlain and John Smith mentioned this bird in accounts of voyages to New England, their remarks are indefinite in respect to geographical localities and do not warrant inclusion of their writings as sources of Maine records. The Norridgewock Abnaki word for the turkey was *nahame*, plural *nahamak* (Rasles, 1833: 383), and essentially the same word, which may be translated as "gobbling," occurred in the vocabulary of certain other Indians, as shown by Speck (1921: 357). John Josselyn, who spent July, 1638 to September, 1639, and August, 1663 to August, 1671, at Black Point (now part of Scarborough), stated (1672; 1865a: 42) that "out of my personal experimental knowledge I can assure you, that I have eaten my share of a *Turkie Cock*, that when he was pull'd and garbidg'd, weighed thirty pound; and I have also seen threescore broods of young *Turkies* on the side of a marsh, sunning of themselves in a morning betimes, but this was thirty years since, the *English* and the *Indians* having now destroyed the breed, so that 'tis very rare to meet with a wild *Turkie* in the Woods; But some of the *English* bring up great store of the wild kind, which remain about their Houses as tame as ours in *England*." Later (1674; 1865b: 78), he stated that one must not give Turkey chicks water if one would keep them alive, reiterated that Turkeys were "excellent meat," especially a capon, and added that Indian women wove coats of Turkey feathers for their children.

Apparently this bird continued to exist on the scrub oak plains to a later time. Williamson (1832: 150) reported that some kinds of birds "which are common in other parts of New-England are seldom here; particularly the *wild Turkey*. A few, however, have been shot in the western parts of this State." Audubon (1839: 559) stated that "some" were still found in Maine, but he may have gotten his data from Williamson or some other indirect source.

Remarks. In August, 1880, a "portion of the tarsus of a wild turkey" was found in an Indian shellheap on the eastern side of Mt. Desert Island (Townsend, 1881). In a letter to Norton, dated January 13, 1941, the late Glover Allen stated: "I do not know of any characters that will distinguish the tarsal bone of the wild from that of the domestic turkey, although, since the latter is believed to have been derived from Mexican birds it is possible that a series would show a slight size difference. It seems rather doubtful if the Wild Turkey ever reached Mt. Desert naturally, though it might easily have been taken there by aborigines from slightly farther south. If it occurred naturally, we ought to find more bones, but I have never seen any in a large amount of material examined." Another fact to be considered is that Indians evidently added 'kitchen' refuse to the heaps after white men were on the same shores, and it is possible that part of a bone of a domesticated turkey might occur in much the same manner as have pig bones which have been found in a number of heaps. Tyson and Bond (1941: 58) stated that the bone in question "very likely was that of a domestic bird (Norton)." In 1942, Norton informed me that he had not so stated, but had indicated that it might fall within the range of variation of that of the domestic bird.

Although an animal name, as applied to a geographical site, often indicates the former presence of that animal, such places as Turkey Cove and Turkey Point in St. George, Knox County, do not indicate necessarily that the bird occurred there. The coniferous forest environment was unsuited to the Turkey. Furthermore, in colonial times in Maine, the word "turkey" was used in various ways—especially as nicknames for persons who were slow-witted or who had many progeny. "Turkey-headed" expresses one of these ideas. The accomplished historian, Cyrus Eaton (1851), made no mention of turkeys in the region where Turkey Cove lies, nor did James Rosier (1605), who visited that section. Turkeytail Lake, west of Millinocket in Penobscot County, is a somewhat fan-shaped body of water.

The reader is referred to G. M. Allen (1921) for a history of the extirpation of this bird from New England.

Family GRUIDAE

Cranes

Grus spp.

Extirpated. At the time of the early voyagers, cranes appear to have been fairly common on the Atlantic slope. One species, at least, occurred northeast to Nova Scotia, and may have been a rare summer resident in Maine. The few Maine records of cranes are entirely lacking in the matter of specific characters and must, therefore, remain hypothetical as to species.

James Rosier, a "Gentleman employed in the voyage" of George Waymouth, who was among the Georges Islands, Knox County, from May 19 to June 16, 1605, wrote (1605; 1887: 103) the following two paragraphs:

"Upon this Iland [? Allens Island], as also upon the former [Monhegan], we found (at our first coming to shore) where fire had beene made: and about the place were very great egge shelles bigger than goose egges, fish bones, and as we judged, the bones of some beast.

"Here we espied Cranes stalking on the shore of a little Iland adjoyning [? Benner Island]; where we after saw they used to breed."

Farther on (ibid. 159) he gave a list of birds in "A Briefe Note of what Profits we saw the Country yeeld in the small time of our stay there." These included Eagles, Hernshawes [herons], Cranes, Ducks great, Geese, Swannes, Penguins [Great Auks], Crowes, Sharks [cormorants], Ravens, Mewes [Gulls], and Turtle Doves [Passenger Pigeons].

There can be little doubt that Rosier correctly identified the cranes since he distinguished between them and herons. It is impossible, however, to ascertain whether "they used to breed," for we cannot be sure that he was familiar with ground nests of cranes or whether he mistook the tree nests of herons. As for the "very great egge shelles bigger than goose egges," there are three birds whose eggs would fit this description, and from what we know of swans in Maine, it seems safe to eliminate them, thus leaving only cranes and the Great Auk to consider. Forbush (1912: 484) believed that the eggs probably were those of a crane, but one cannot safely rule out the possibility of their having been those of the Great Auk. It can be proven that the latter birds were common in our waters in summer, and if they nested at Monhegan where Rosier (1605; 1887: 95) found "much fowle of divers kinds" breeding upon the shores and rocks, Indians, on their way to the mainland, could well have carried the eggs to the inner island and eaten them there. We cannot positively identify the eggs,

however, nor accept unquestioningly Rosier's statement that cranes used to breed.

Levett (1628; 1847: 82) mentioned "crane" among birds eaten in the winter of 1623–24 at what is now Saco, York County. He is one of several early writers who mentioned cranes but not herons, thus leaving room for doubt as to which kind of bird actually was involved.

Like Rosier, Josselyn distinguished between cranes and herons. In his list of birds occurring in what is now Scarborough, Josselyn (1674; 1865b: 79) listed first among the waterfowl "*Hookers* or wild-*Swans*, *Cranes*," and, in the same paragraph in a list of lesser waterfowl, he included "*Herons*" and "grey *Bitterns*."

In his somewhat garbled list, Williamson (1832: 145) mentioned not only a white "Stork," but also "Crane," the latter, under the name *Ardea Canadensis*, described as being of a "lead colour," but there are no particulars about occurrence or how he came to include these in his list.

Ganong (1910: 219–220), in an excellent paper summarizing much natural history of the early voyagers 'down east' beyond our borders, pointed out that Lescarbot in 1612, Denys in 1672, and Champlain in the early 1600's, mentioned Grue or Gruë (crane, *Fr.*) and herons. Ganong reasoned that, when early explorers mentioned both cranes and herons, the former were bitterns! His basis for this conclusion was that the crane of Europe "has no representatives" in eastern Canada; in other words, he seems not to have been aware that true cranes once existed in the northeast. Two recent writers on Denys' birds, in the *Auk*, omit this subject entirely.

In his Indian-French dictionary of the Norridgewock Abnakis, Father Rasles (1833: 383) defined *Tarégan*, plural *Tarégak*, as Grue; he also (p. 384) gave *Kasks* for heron, and *Amskameness* for bittern ("oiseau qui regarde le soleil"). I have taken up the matter of cranes *vs.* herons in Algonkian dictionaries with Mr. William B. Cabot of Boston. Our joint findings point to the fact that a large bird other than the Great Blue Heron was recognized, but native words were recorded so poorly, often by persons having little knowledge of natural history, that the distinction between crane and heron seems less clear in the dictionaries than it probably was with the Indians.

There seems to be no mention of crane bones in the literature on New England shellheaps. Much material from these heaps has not been critically studied, however, and so unexpected an object as a crane bone might easily have been overlooked or misidentified.

It seems possible that, in early times, *Grus canadensis* may have nested in the northeast, and probably that part of a more northerly nesting population followed a migration route that included northern New England and points farther 'down east.'

Family RALLIDAE

Northern King Rail

Rallus elegans elegans Audubon

Rare *visitant* (August 8–December 17), records for Cumberland, Hancock, and Penobscot Counties.

Records. In August, 1899, a female was shot at Falmouth, Cumberland County, and is now in the collection of Walter Rich. On August 8, 1939, at Corinna Stream, Penobscot County, Howard Mendall watched three King Rails for nearly an hour, at times at distances of less than 15 feet. On September 4, 1893, Rich shot one at Falmouth, which is now in his collection (Rich), and on September 19, 1895, he shot another there (Brock, 1896a), which is in the Brock collection in the Portland Society of Natural History. On September 22, 1916, John Whitney shot one in Falmouth (Norton). On October 8, 1881, Rogers shot one at Scarborough (N. C. Brown, 1882f: 29), which Smith (1882–83: 124) erroneously stated was shot on October 1; it is now in the collection of the Portland Society of Natural History. E. N. Atherton shot a young male on October 14, 1918, at Scarborough, and had the bird mounted. A male was shot on November 22, 1909, at Bucksport, Hancock County, and was preserved (C. L. Phillips, 1919). A male, shot on December 17, 1899, at Falmouth, was obtained by Brock (1902b).

Remarks. Four large rails, shot in the vicinity of Portland, were not preserved or examined by an ornithologist. One was shot about September, 1864, and another was taken on October 17, 1866, in Falmouth. Samuel Hanson, who shot the latter, stated that he saw two others in the game-bag of a local sportsman at about the same time. These four birds were listed as Clapper Rails by N. C. Brown (1879: 108), the present species not having been recorded from the state. Later, however, he (1907) appeared to lean toward the belief that the birds had been King Rails. Although this seems probable, their identity cannot now be established.

The Falmouth records of Rich for September 19, 1895 and August, 1899, and of Brock for December 17, 1899, were cited wrongly by Knight (1908b: 138).

Northern Clapper Rail

Rallus longirostris crepitans Gmelin

Four records, three being for specimens. One was shot in 1874 at Sabattus Pond, Androscoggin County, and preserved in the collection

of J. Y. Stanton (Smith, 1882–83: 124). This collection is now at Bates College in Lewiston. One was shot the last week of December, 1875, at York, York County, and reported by "E." in a journal called *Country*, issue of February 14, 1878; this specimen was preserved by Mr. Vickery of Lynn, Massachusetts (N. C. Brown, 1879: 108). Spinney (1902b: 44–45) recorded, for 1900: "October 12. I came into possession of the Clapper Rail, the bird being taken at Popham Beach [Sagadahoc County], Me. It was found in a marsh, and in a few days I also saw another at the same place, which I crippled. Although I had a dog with me and saw where the bird lit down (it flying some distance after being shot at) I or the dog was unable to find it, although I spent an hour searching for it." The specimen obtained is now in the State Museum at Augusta, where Norton examined it.

Remarks. Smith (1882–83: 124) stated that this bird had been taken "at various times on the coast," but the above instances are the only certain ones at hand. See Remarks under King Rail for certain supposed Clapper Rail records cited by N. C. Brown (1879: 108).

Northern Virginia Rail

Rallus limicola limicola Vieillot

Summer resident, uncommon throughout most of the state; *transient* in spring and fall in unknown numbers (probably uncommon).

Spring. Whereas Knight (1908b: 140) stated that the first birds arrived in late April, the earliest specific record is for a male shot on May 2, 1911, at Scarborough (Norton).

Fall. Migration is known to be under way by September 17, but probably begins earlier. Generally the last birds have departed by about October 25. Several were seen at Bath, and one caught in Phippsburg, both in Sagadahoc County, on November 10 or 11, 1883 (C. H. Greenleaf).

Breeding. The nest is made of coarse grasses or other marsh vegetation, and usually situated in a hummock or a clump of vegetation in shallow water or in a damp situation. Egg data are: ten on June 10, 1947, at Davis Pond in Eddington, Penobscot County, and seven on June 12, 1945, near the Pennamaquan River, Pembroke, Washington County (J. Gashwiler); seven, slightly incubated, on June 14, 1939, near Bangor (Eckstorm); eight on June 22, 1940, at East Corinth, Penobscot County (H. Briggs); nine fresh on July 3, 1946, at Frankfort, Waldo County (Harris); and eight on July 11, 1947, at Magurrewock Marsh, Calais (J. Gashwiler). In Quebec, Mousley (1940: 89) found incubation to be 18 to 19 days.

Dates for young in Maine are: at least six small ones with adults in June, 1932, at Bath (Spinney); adult with one young the last week in June, 1933, at Harpswell, Cumberland County (H. T. Pulsifer); adult with one chick and one or two adults together with four chicks, July 3 to 5, 1947, at Scarborough (Webb *in* Dana, 1948a: 9); two adults with about 20 young on August 2, 1929, at Portland (Mrs. L. R. Brown); five newly hatched chicks and two infertile eggs on August 5, 1896, at Hartland, Somerset County (Knight, 1897d: 41); and downy young in August, 1893, at Fryeburg, Oxford County (Mead *in* Knight, ibid.). There are less definite reports for several other localities. The young leave the nest soon after hatching; the fledging period apparently is unrecorded. One brood is raised yearly.

Ecology. This bird is found mostly in large marshes, often where there are extensive areas of cattails, and also quite frequently in rather small marshy places.

Remarks. There are no records of occurrence in Aroostook, Piscataquis, and York Counties.

Two melanistic examples of this rail have been taken near Portland.

Sora

Porzana carolina (Linnaeus)

Summer resident, rather rare at scattered points throughout most of the state but perhaps fairly common in parts of eastern Washington County; *transient* in spring and fall, more common and widespread at the latter season.

Spring. This bird arrives in "late April" (Knight, 1908b: 141), or the first week in May. An unusual record is for a bird caught and banded on March 17, 1937, at Otter Creek on Mt. Desert Island, by Mrs. E. A. Anthony (Tyson and Bond, 1941: 58). The next earliest record is for one found dead on May 3, 1938, near Calais, by Mendall. Data are lacking to indicate the duration of the spring migration.

Fall. A bird, presumed to have been a migrant, was seen as early as September 5, 1894, at Seguin (Spinney). Migration reaches its peak in late September and the first ten days in October and, usually, the species has departed by October 26. Several were shot on November 1, 1927, in Bowdoinham at Merrymeeting Bay (Haven). Island occurrences of interest are for offshore Monhegan on September 12, 1918 (Dewis, 1919: 37, 41), and October 20 and 22 of the same year (Wentworth *in* Jenney, 1919: 26).

Breeding. Outside of Maine, nests are reported as usually in fresh water marshes, and are raised above the ground or water's surface,

often on a hummock, being supported by grasses and other vegetation. Maine nesting data are: four eggs on May 30 and 13 in the clutch on June 15, 1946, a young bird just leaving a nest on June 19, 1946, and five eggs in a nest on July 11, 1947, all in Magurrewock Marsh, Calais (J. Gashwiler); five eggs on July 22, 1894, near Palmyra, Somerset County (Knight, 1908b: 142); "eggs" on July 27 of unstated year and locality (G. M. Allen, 1909: 62); and "eggs" taken near Bangor in July, 1898 (Knight, 1898c). In Michigan, the incubation period was found to vary from 16 to 19 days (Walkinshaw, 1940: 161). The fledging period apparently is unrecorded. Probably a single brood is raised yearly.

Ecology. In the breeding season, this is a bird of fresh or brackish water marshes and, in migration, also an inhabitant of salt water marshes. Probably the most extensive breeding habitat is in marshes in Washington County where Boardman (*in* Baird, Brewer, and Ridgway, 1884, 1: 372), a half century ago, reported it to be "much more common" than the Virginia Rail. Mendall is of the opinion that both species now are present there as breeders in about equal numbers.

Remarks. Although this bird probably occurs in suitable habitat throughout the state, records are lacking for Franklin, Kennebec, and Piscataquis Counties.

In the fall, fairly large numbers concentrate at Merrymeeting Bay and in the salt water marshes of Cumberland County. The best time to observe these concentrations is during a full moon tide in late September or early October.

During migration, these rails often are picked up by roadsides and even on city streets, after having flown into some object during the night.

Northern Yellow Rail

Coturnicops noveboracensis noveboracensis (Gmelin)

Status not well known except rare in *fall* in Washington, Penobscot, Knox, Lincoln, and York Counties, and occurring regularly but in variable numbers in Cumberland.

Spring. No definite records. (See Remarks.)

Fall. The earliest fall record is for September 19, 1910, at Falmouth, Cumberland County (Norton). For the Scarborough and Portland region, N. C. Brown (1882f: 30) referred to this bird as "generally rare," but "occasionally quite common," and occurring as late as the "middle of November," 1876. A male was shot on November 14, 1921, at Falmouth (Haven). One, fat and apparently in healthy condition, was shot on December 20, 1883, at Biddeford, York County (Smith).

Flight years. For *1881*, Smith (1882–83: 124) stated that "numerous" Yellow Rails were shot in the vicinity of Portland in the fall. For *1905*, in the Portland region, Brownson (1905d) stated that in the fall, "the little Yellow Rail, usually so rare, has been here in unusual numbers."

Remarks. G. M. Allen (1909: 63) noted "May 31" for spring occurrence, but this cannot be accepted unquestioningly, for apparently it was based on rails *heard* on that date in 1902, at Orono and Hermon bogs in Penobscot County, as reported by Swain (1902b: 41, 42). As a matter of fact, Knight, who was a member of the party, did not include this incident as a record in any of his published writings.

Eckstorm told Mendall that the species once nested at Magurrewock Marsh, Calais. This was prior to 1935 and probably based on young birds rather than eggs, but no details are available now. For the same region, Knight (1908b: 143) wrote: "Mr. Boardman found it nesting in Washington County, the nest being placed on the ground in similar situations to that of the Sora." Knight probably learned this directly from Boardman in correspondence. Mention of occurrence in the breeding season in Maine, in the 1931 *A. O. U. Check-List*, undoubtedly was based on this citation.

Squires (1945: 13) stated that the Boardman set of eggs was "the only set of Yellow Rail eggs ever found" in New Brunswick. A letter of February 27, 1948 from Squires states that Boardman found a set of five eggs on September 10, 1881, in a meadow at Milltown, New Brunswick, and that these fit quite well the description of eggs given by Terrill (1943: 174) and the measurements given by Forbush (1925: 360), but that the markings "seem to be more widespread than suggested by Bent (1926: 320) or Terrill (1943: 174)." So late a date for eggs certainly is unusual. [Since this was written, Bond wrote to me that he saw these eggs in 1948 and doubts that they are correctly identified; he intends to examine them again.]

Black Rail

Laterallus jamaicensis (Gmelin)

Hypothetical. A black rail, never identified, was caught by a dog on October 4, 1881, at Scarborough. Some writers have made it appear that the bird was shot and that it was recorded as a Black Rail. The original report by Smith (1882–83: 124) was as follows: "Upon the fourth of October, while my friends, Jonas Hamilton and Alpheus G. Rogers, of this city [Portland], were shooting at Scarborough, Mr. Hamilton's setter dog brought to him, alive and unhurt, a black rail.

The bird was probably of the species *Porzana jamaicensis*. Both gentlemen have a familiar knowledge of our common species of rails, and especially noted that this bird differed from the 'sora' or Carolina rail and the yellow rail in form as well as in plumage. Unfortunately the specimen was not preserved, and it may possibly have been an instance of melanism of the young yellow rail."

Corn Crake

Crex crex (Linnaeus)

One record. A bird was shot on October 14, 1889, in the Dyke marsh at the mouth of the Presumpscot River, Falmouth, Cumberland County (Brock *in* Webster, 1890b: 30; Brock, 1896c). This specimen is now part of the Brock collection in the Portland Society of Natural History.

Another bird, shot at the same time but too mutilated to save, was identified as this species by the gunner who shot it (Brock, 1896c).

Purple Gallinule

Porphyrula martinica (Linnaeus)

Rare *visitant* or transient in spring (late March to late April) and fall (late September to December 17), usually near the coast; 13 known occurrences.

Spring. Mrs. E. A. Anthony has in her collection a specimen that was captured alive, between March 19 and 25, 1941, at Southwest Harbor on Mt. Desert Island; a male was taken on April 2, 1898, at Eastport, Washington County (Forbush, 1925: 365); one was taken on April 11, 1897, at South Lewiston, Androscoggin County (Farrar *in* Knight, 1897d: 42; Powers, 1897h); one was found dead at Bar Harbor, Mt. Desert Island, by F. Leach (Tyson and Bond, 1941: 58), the date being April 18, 1928 (Mrs. E. A. Anthony); and an adult bird was found exhausted in late April, 1929, at Warren, Knox County (*Kennebec Journal*, April 26, 1929).

Fall. One was taken in late summer, 1869 or earlier, near Calais (Boardman, 1869c; Baird, Brewer, and Ridgway, 1884, 1: 385); a male was captured alive, the latter part of September, 1877, at Boothbay, Lincoln County, and it later escaped (Purdie, 1880); a male was shot on October 15, 1925, at Abagadasset Point, Merrymeeting Bay (Walch, 1926: 17); a young bird was seen at very close range on October 21 and 22, 1941, at Merrymeeting Bay (O. Lothrop); an

immature bird was shot on October 28, 1924, at Dresden, Lincoln County (Norton); an immature male was taken a few days prior to November 7, 1899, at Winter Harbor, Hancock County, and received, via express, on that date at Seguin (Swain, 1900c; Spinney, 1902b: 45) [several times this specimen has been cited as taken at the latter place or on the date mentioned]; one was caught by a cat on December 17, 1906, at Farmingdale, Kennebec County (Powers, 1907: 52).

Remarks. An undated record is for an immature bird caught by a cat in the late 1870's at Nortons Island, St. George, Knox County; this was the basis for listing by Rackliff (*in* Knight, 1897d: 42) of rare Knox County occurrence.

Florida Gallinule

Gallinula chloropus cachinnans Bangs

Visitant or transient, rare in spring and fall, usually near the coast; two *summer* records, one of *breeding.*

Spring. One was seen on May 3, 1925, at Machias, Washington County (F. Kilburn); one was shot on May 5, 1883, at East Sullivan, Hancock County (Smith *in* Knight, 1908b: 145); one was taken in the spring of 1871, "near Calais" (Boardman, 1871c); and one taken in the spring of 1903, at Falmouth, Cumberland County (Lord *in* Knight, 1908b: 145).

Fall. Records include: in 1894, one immature male taken on September 20, and another on the 30th, at Falmouth (Brock, 1896d); one shot at the same place on October 12, 1929 (Norton); one shot on October 15, 1907, at Scarborough (Norton, 1908a: 81) [cited as "Portland" by W. Cooke, 1914: 43]; an immature female shot on October 15, 1927, at Merrymeeting Bay (Haven, 1927: 157); one shot the "middle of October," 1936, at Scarborough (E. Monroe); one shot on October 22, and another on the 26th, 1921, at Merrymeeting Bay (Walch, 1926: 17); and one shot on October 26, 1936, at Cape Elizabeth (Norton).

Breeding and summer. Outside of Maine, the nest is reported as being a hollow in a platform of vegetation, aground or nearly afloat, in fresh water marshes. A. Allen (1931) made the following observations in New York: clutches consist of 9 to 14 eggs; incubation begins before the clutch is completed, the period being 21 days; a male led the young back to the nest to be brooded before the last egg hatched, but at other times he built little platforms of rushes on which to brood them himself; and in seven to eight weeks, the chicks were in full juvenal plumage and were capable of long flights.

The Maine breeding record is for an adult with a brood of young,

seen by Mendall in the summer of 1938, at a tributary of Sebasticook Lake in Newport, Penobscot County.

A male in nuptial plumage was shot on June 5, 1909, at Falmouth (Norton).

Ecology. This bird usually is seen near or among flags and sedges about the margins of ponds and streams.

Remarks. Less definite records than those already cited are: mention as a rare migrant in Androscoggin County by Johnson (*in* Knight, 1897d: 43) and Miss Miller (1918: 71); and mention of specimens from Penobscot County occasionally being brought into taxidermy shops (Knight, 1908b: 145).

In the digestive tract of the female taken on October 15, 1907, at Scarborough, were four snails (*Planorbis campanulatus*) and a few seeds (Norton, 1908a: 81).

Northern American Coot

Fulica americana americana Gmelin

Transient, rare in spring and rather common in fall, occurring mostly near the coast; rare in *summer* (may breed) and *winter.*

Spring. Of the few occurrences noted at this season, the earliest is for a bird caught alive on March 26, 1926, in Portland Harbor (Norton) and the latest is for April 14, 1903, at Avon, Franklin County (Sweet, 1905a: 42). (Also see Remarks.)

Fall. One was seen on August 14, 1938, in Muscongus Bay (Cruickshank). In late September and throughout October, birds migrate through the state. Individuals or small groups stop at any suitable place along the way, but only are found concentrating in numbers at favorable feeding places, especially near the coast. Some birds linger until the middle of November or even later.

Summer. Sweet (*in* Brownson, 1909: 82) reported this species on June 2, 1908, at Avon. It has occurred about June 30 in 1935 and 1936, near Jackman, Somerset County (A. R. Phillips). In a letter of February 5, 1947, Cruickshank stated that this species "probably breeds" at Bath, Sagadahoc County, having been seen there all summer.

Winter. There are three occurrences in Cumberland County: one seen on December 11, 1938, in the Dunstan River at Scarborough (Norton); one, apparently healthy, seen on January 22, 1921, at Falmouth (J. Whitney); and one caught alive in slush ice by small boys on February 1, 1924, in Back Cove, Portland, and brought to Norton who released it.

Ecology. Migrant birds in Maine usually are found in fresh water ponds that are rich in aquatic vegetation and near salt water. The brackish waters of Merrymeeting Bay, with its extensive wild rice beds, are a noted gathering place in fall.

Remarks. Records clearly indicate that this bird formerly was much more numerous in Maine than at present.

Audubon (1835: 293) wrote that some traveling lumbermen assured him that "the Coot breeds in numbers in the lakes lying between Mars Hill [Aroostook County] in Maine and the St. Lawrence River." He expressed doubt, however, as to the authenticity of these reports.

Reported occurrences of "American Coot" at Castine, Hancock County, for March 23, 1904 (Ridley *in* Sweet, 1905c: 61) and May 13, 1905 (Ridley *in* Sweet, 1906b: 35) probably refer to scoters. The extreme spring dates given by G. M. Allen (1909: 65) appear to have been based upon these reports.

Family HAEMATOPODIDAE

Eastern American Oyster-catcher

Haematopus palliatus palliatus Temminck

Former transient; no recent certain records.

Audubon (1835: 181) stated: "It seems scarcer between Long Island and Portland in Maine, where you again see it, and whence it occurs all the way to Labrador, in which country I found that several were breeding in the month of July." He further stated (p. 182): "On the coast of Labrador, and in the Bay of Fundy, it lays its eggs on the bare rocks." T. M. Brewer (1875: 445) recorded the species as rare in Maine, undoubtedly on the basis of Audubon's writings.

Remarks. Norton (1898b) pointed out that Audubon's first-hand observations indicated that he probably did see the bird near Portland, as well as farther northeastward. He also suggested that this conspicuous bird could have been extirpated from Labrador by fishermen in the period from Audubon's visit to 1860, during which time few or no ornithologists of note recorded observations on the birds of that region.

A game warden described a bird seen in October, 1936, on mudflats near Belfast, Waldo County, that was probably an Oyster-catcher (Mendall).

The specimen obtained by Boardman, and reported by Smith (1882–83: 44) as shot "near Eastport," was taken on Grand Manan, New Brunswick (Baird, Brewer, and Ridgway, 1884, 1: 113).

Family CHARADRIIDAE

Lapwing

Vanellus vanellus (Linnaeus)

One specimen of this Old World species, in the collection of the Boston Society of Natural History, was taken on December 21 or 22, 1927, on the ice at Square Lake, Sinclair, in the township of St. Agatha, Aroostook County (W. S. Brooks, 1928; J. L. Peters, 1929: 10).

Remarks. This bird was one of the large number of stragglers that occurred in northeastern North America in December, 1927.

Extralimital records are for three birds taken at this time, and one taken on January 6, 1928, in the Grand Manan archipelago, as recorded by Pettingill (1939a: 335).

Eastern Piping Plover

Charadrius melodus melodus Ord

Summer resident, common on sandy beaches from Kittery, York County to Cape Elizabeth, on beaches in Phippsburg and Georgetown in Sagadahoc County, and seen rarely eastward; *transient* in spring and fall, small flocks being noted in coastal Sagadahoc, Cumberland, and York Counties, and individuals or very small groups rarely farther eastward.

Spring. Usually this species has not been noted until April 15 or later, but there are these earlier dates: two seen on March 22, 1938, at Scarborough (G. Reeves); one seen there on March 25, 1922 (C. Pangburn); and one seen on April 13, 1942, at Drakes Island, Wells, York County (G. Dunthorne).

Fall. Flocking begins by the first week in August and migration is in evidence by the middle of the month. I find no records after September 20, except for a single bird seen by Norton on October 2, 1940, at Scarborough.

Breeding. The nest, a shallow depression on a sandy beach, is lined, more or less, with pieces of sea shells and small pebbles. On Long Island, Wilcox (1939) found that eggs are laid on alternate days until the clutch of four is completed, and that incubation, mostly by the female, requires 26 to 30 days. The earliest Maine date is for two sets of four found on May 4, 1946, at Scarborough (G. Webb). Data at hand for about 24 sets indicate that they were completed from early May to early June. Hatching dates range from May 31 to June 27, with the one exception of a set of four I found hatching on July 1, 1938, at Popham Beach, Phippsburg, Sagadahoc County.

On Long Island, Wilcox found that the young did not move more than about 400 feet from the nest up to the time they were able to fly at the age of about 30 to 35 days. At Scarborough, a young bird able to fly on June 19, 1941 (Norton) would indicate an earlier laying and hatching date than any given above. One brood is raised yearly.

Ecology. This bird is found chiefly on sandy beaches, and rarely where the terrain is somewhat rocky. Nests are on the open beach, well back from the water's edge, and occasionally among clumps of beach grass.

Remarks. In the 1890's, this bird was nearly extirpated from our beaches, but it has again increased, perhaps now approaching its former numbers. It has bred since 1911 at Scarborough, but only recently has its breeding in the state received any publicity. In the last few years there have been reports of its occurrence in summer on Penobscot Bay islands. Eventually, perhaps, it will be found breeding on small sandy spots on the coast or islands of eastern Maine—if such spots are not disturbed too often by picnickers.

In early August, 1938, I saw 20 birds in a flock at Popham Beach; flocks of similar size are seen quite regularly on beaches in southwestern Maine at about this season and later.

Of this bird's status at the mouth of the Bay of Fundy, Boardman (1862: 128) wrote: "Summer visitant. Abundant. Breeds on islands in the middle of June." Whereas it may have bred here occasionally, the implication of abundance in such unsuitable habitat is indeed questionable.

Semipalmated Ringed Plover

Charadrius hiaticula semipalmatus Bonaparte

Transient, common coastwise in spring and numerous in fall, and uncommon though regular inland at the latter season; rare *non-breeding summer resident.*

Spring. This plover usually arrives after May 20, rarely being present by May 10, and once reported, in Bent (1929: 226), for May 5 at Saco, York County. Most birds have departed by June 11, with later records as follows: one seen on June 18, 1919, at Scarborough (Norton); four seen on June 22, 1896, at Saddleback Ledge, Hancock County (Knight, 1897d: 52); and one seen on June 22, 1909, at Upton, Oxford County (Brewster, 1925: 275).

Fall. This bird has been seen from July 25 to 31 in eight different years, and generally is noted by August 4. It is common to numerous from August 12 to about September 20 along the coast, with decreasing numbers seen thereafter to October 13. Later records are: five seen

on October 19, 1940, at Wells, York County (Norton); one seen on October 20, 1940, on Mt. Desert Island (Eckstorm); one seen on October 22, 1927, at Cape Elizabeth, and two on the 26th at Portland (Norton); two seen on November 5, 1911, at Scarborough (Pillsbury); and one shot on November 11, 1912, at Scarborough, and seen in the flesh by Norton.

Summer. Since it is impossible to distinguish sharply between summer and other seasons' occurrences, I here include only those from July 8 to 22, as follows: "small numbers" seen on July 8, 1920, at Popham Beach, Sagadahoc County, and one seen on July 14, 1927, at Milbridge, Washington County (Norton); one seen on July 15 and 18, 1939, at Scarborough (Mrs. E. Dodge); July 19 of unstated year in the Umbagog region [? Me. or N. H. part] (Brewster, 1925: 273); and two or three seen on July 22, 1935, at Back Cove in Portland (Rich).

Ecology. This bird is found most frequently on mudflats between the tide lines, and often on sea beaches and mud banks of streams and rivers inland. It is especially attracted to silt-covered areas of mudflats, where small nemertean worms abound.

Remarks. This species has not yet recovered completely in numbers from the several decades of unrestricted gunning.

Spring and early fall transients are in nuptial plumage. In August, during periods of active feeding, considerable display may be seen. With head lowered, wings raised, tail spread, and uttering a 'chuckling' note, one bird will run toward another. The second bird usually retreats, but may rarely respond by posturing in a similar manner. The display ends quickly and feeding is resumed. The number of nuptial-plumaged birds drops markedly about the first of September, and young in first fall plumage increase for the next two or three weeks.

Boardman (1903: 309) wrote that this bird was "Common in summer" about the mouth of the Bay of Fundy. Smith (1882–83: 44) gave the following New Brunswick data: "I have procured an egg of this species on an island in the Bay of Fundy, but it is a very unusual occurrence to find the bird breeding so far south as that, and none are known to breed in Maine."

Wilson's Thick-billed Plover

Charadrius wilsonia wilsonia Ord

Hypothetical. The *A. O. U. Check-List* (1931: 105) includes occurrence as "Casual north to Nova Scotia and New England." There is an unconfirmed report of one seen in September, 1933, at Old

Orchard Beach, York County, by W. Deane. There are Nova Scotia, Vermont, Massachusetts, and Connecticut records.

Northern Killdeer

Charadrius vociferus vociferus Linnaeus

Summer resident, fairly common in coastal counties to Sagadahoc, with diminishing numbers into Hancock, and, inland, rather common to eastern Penobscot and northern Aroostook Counties; two *winter* occurrences, one a storm incursion.

Spring. This bird arrives in southwestern counties from March 26 to about April 7. One seen on March 9, 1946, at Georgetown, Sagadahoc County (W. Taber), probably had been driven there by a southeast gale of some two weeks earlier. Other early dates are: one seen on March 18, 1907, at Scarborough (Pillsbury), and one on March 19, 1933, at Portland (G. Reeves). Inland, three birds were seen as early as March 27, 1945, at Glenburn, Penobscot County (Mendall), four on April 3, 1946, at Brewer (Weston), and the earliest Aroostook County date is April 29, 1934, at Presque Isle (Chamberlain, 1935: 316). Migration continues at least into the last week in April in Cumberland County.

Fall. The Killdeer departs in September and early October. Late records are: about 50 seen on October 12, 1940, at Corinna Stream, Penobscot County (Mendall); one seen on October 16, 1927, at Scarborough (Norton); two seen on October 24, 1905, at Avon, Franklin County (Sweet, 1907: 68); and six seen on November 8, 1941, at Corinna Stream (Mendall).

Breeding. Nesting sites in Maine include old fields, hayfields, golf courses, potato fields and gardens, airfields, places where cinders have been spread, between abandoned railroad tracks, and on outcrops of gravel. The eggs (all records are for four) are laid in a slight depression to which a few pebbles or pieces of debris have been added. Four eggs, about half incubated, were found as early as May 3, 1941, at Hermon, Penobscot County (Eckstorm), four on May 8, 1942, at Monmouth, Kennebec County (Mrs. C. Norton), and four on May 10, 1937, at Cape Elizabeth (Norton). The latest date for unhatched eggs is June 18, 1928, at Lewiston, Androscoggin County (Norton).

In Michigan, the incubation period has been found to vary from 24 to 26 days (Nickell, 1943: 28). Both sexes incubate. The fact that newly hatched young were found on May 12, 1941, by C. Fobes at Portland, may indicate earlier laying than for any of the clutches noted above. The age of attaining flight is unknown, but many young

are flying by July 20. Nickell (ibid.) reported adults attending the brood for periods up to nearly six weeks. In Maine, it is likely that two broods occasionally are raised yearly.

Winter. On November 25, 1888, in the wake of a violent northerly storm, Killdeers began to occur on the coast, increasing in numbers the next few days until hundreds were present. This unusual flight was noted from the Isles of Shoals and points eastward to Grand Manan, the birds being seen at many lighthouses along the coast. Their numbers decreased steadily through December, the last certain Maine record being for three birds shot on December 25 at Cape Elizabeth. They lingered at the Isles of Shoals until the last week in February. Details of this unique flight were related by N. C. Brown (1889 and 1911a), Chadbourne (1889), and Torrey (1889).

A single bird was shot on January 20, 1912, at Great Chebeague Island in Casco Bay (Norton).

Ecology. The Killdeer generally is found in dry gravelly places or where the grass is short. In migration, it is found often on fairly dry mud about inland watercourses, and occasionally on flats and beaches about salt water.

Remarks. This bird probably was a rare visitant in colonial days. Even later, Williamson (1832: 147) stated that it was not seen often, and Audubon (1835: 192) reported that few were seen in Maine. Verrill (1862a) did not record it at Norway, nor did Hamlin (1865) at Waterville. Smith (1882–83: 44) recorded only 17 Killdeers taken in the Portland-Scarborough region from 1849 to 1870. Up to 1884, only a few individuals had been seen in fall in the Calais region, as reported by Baird, Brewer, and Ridgway (1884, 1: 149). In 1897, Hardy (*in* Knight, 1897d: 52) reported occurrence about Brewer "forty years ago." Knight (ibid.; 1908b: 188–189) considered it a "very rare," but definitely not an "accidental," migrant and listed it for seven counties. Between 1895 and 1900, Norton saw only three or four birds at Westbrook, Cumberland County, these occurring in migrations. A definite increase began about 1907 and has continued steadily to the present. The bird now is common in summer at localities in much of western, central, and northern Maine, but numbers decrease coastwise from eastern Sagadahoc County eastward so that there are few Washington County records. Lack of records for some suitable inland areas appears to be due to lack of observers.

On October 5, 1918, Norton received a juvenal male, with down still adhering to the rectrices, shot that day at Scarborough. There were no actual nesting records, however, until about ten years later. By 1933, the species had nested as far as Cape Rosier, Hancock County, and it now may be expected to breed wherever found in summer.

During the storm flight of 1888, S. B. Angell, while at a Coast Guard station on Cape Elizabeth, shot about 75 of these birds and sold them at a Portland market for 30 cents per pair (Norton).

Eastern American Golden Plover

Pluvialis dominica dominica (Müller)

Fall transient, rare coastwise. One recent inland record.

Occurrence. Most records are for August 20 to October 22. In former years when the species was plentiful, the main wave of migration occurred in late August, with sometimes a smaller one about the middle of September. The earliest record is August 12, 1906, at "Portland" [probably Scarborough] (*in* Brownson, 1907c: 37). Late records are: October 26 of unstated year in the Umbagog region [? Me. or N. H. part] (Brewster, 1925: 269); one shot on November 2, 1875, and two on November 8, 1867, at Scarborough (Rogers); another shot there on November 15, 1907 (Brownson, 1907f: 108); and another (? cripple) on December 1, 1882 (N. C. Brown).

Flight years. "There was a remarkable flight of Golden Plovers through Maine during the last of August and the first part of September, *1853*, such as has never since been witnessed here, and which resembled a flight of [Passenger] pigeons. For days the air was clouded with the incessant passage of flocks of these birds, and great numbers were killed" (Smith, 1882–83: 44). In *1870*, "many" came to Scarborough during a storm, about September 12, and all left as soon as the weather cleared (Smith); in *1877*, there were "enormous" flocks on the upper Dunstan marshes at Scarborough from late August to early October (N. C. Brown); and in *1878*, a "great many" came to Scarborough with the great flight of Eskimo Curlews in the evening of August 25 (Smith).

Remarks. In fall, the main migration route of this plover extends from Nova Scotia southward over the Atlantic to the Lesser Antilles. Until about 1880, flocks of 20 to 60 birds were regularly common at Scarborough, and rarely, flocks containing up to 200 birds were seen there (N. C. Brown). Flight years were occasions when unusual numbers deviated from their normal route and reached our coast. Considering the number of scattered inland occurrences, as given by Knight (1897d: 52; 1908b: 187) and Brewster (1925: 269–272), it appears that some of these birds took an overland route, just as a small number of several other shorebird species do. On October 9, 1948, about six were seen inland at Graham Lake, Hancock County, by Weston.

In former years, this plover was seen most often on dry uplands near the coast, in cut-over fields and the drier parts of marshes, although it by no means avoided beaches and shores. Flocks were seen often on grassy islands. The Eskimo Curlew was the most common associate, with the Black-bellied Plover ranking second.

In the early 1850's, these birds sold in Portland for 25 cents a dozen, and many spoiled (Manasseh Smith). Not only was this plover a tasty table bird, but also unwary enough to make an easy target. From 1842 to 1854, Loring shot 705 Golden Plovers at Scarborough, and between 1891 and 1912, Pillsbury shot only 150 there, his largest bag being 15 in 1895. Numbers decreased steadily and the birds were scarce for several decades before shooting was legally ended in 1926. Even under protection, however, recovery has been very slight.

Western American Golden Plover

Pluvialis dominica fulva (Gmelin)

One specimen, an adult female shot on September 11, 1911, at Scarborough, is in the Norton collection (Norton, 1916: 381), now in the Portland Society of Natural History.

Remarks. I failed to find this specimen in a hurried search in early July, 1947, but this is not surprising, for the birdskin collection is, at present, in a disorganized state. In his unpublished notes, Norton listed the measurements, and these are very close to average for adult females, as given by Ridgway; the color notes also fit this race well. Dr. Jonathan Dwight concurred with Norton as to the identity of the specimen. This record was not cited by Forbush, nor in the 1931 *A. O. U. Check-List.*

It is interesting to note that recently Rand (1947a: 283) reported three specimens of this race from Greenland.

Black-bellied Plover

Squatarola squatarola (Linnaeus)

Transient, common coastwise in spring and fall, and occasional inland at the latter season; rare in *summer.*

Spring. This plover arrives in southwestern counties May 14 to 19, and leaves about June 1, with occasional individuals or small flocks lingering until June 11. Early records are for a female shot on May 9, 1882, in the Portland-Scarborough region (N. C. Brown, 1882f: 24), and about a dozen birds seen on May 10, 1912, at Scarborough

(Pillsbury). In 1868, five lingered at Scarborough until June 14, when one was shot, and one was seen on June 16 and 17 (Smith).

Fall. Birds arrive rarely by July 26, and are common from August 14 to about October 24. Migration is most noticeable from late August through September. Some birds have lingered infrequently until October 31. Late occurrences are: about 30 birds in two flocks on November 11, 1938, at Scarborough (Norton); three seen on November 11, 1942, at Scarborough (Norton); and 11 seen on November 12, 1938, at Georgetown, Sagadahoc County (R. Stackpole, W. Taber).

Flight years. In *1911*, the number present at Scarborough was "unusually large" on May 27 (Pillsbury), and in *1932*, there was an "unusually large flight in the Casco Bay region" on May 27 (J. R. Wallace).

Summer. Occurrences at this season are: June 24, 1895, on Western Egg Rock in Muscongus Bay (Norton *in* Knight, 1897d: 51); June 20 and July 5, 1938, in Muscongus Bay (Cruickshank); and, on July 9, 1936, a flock of six seen at Little Green Island, off western Penobscot Bay, and on July 15, 1941, one at Pine Point, Scarborough (Norton).

Ecology. This bird, our most common large plover, usually is found on mudflats and in very shallow pools in marshes. Though generally remaining close to salt water, it occasionally resorts to uplands. When occurring well inland, it is found in marshes and on bars or mudflats along rivers and in ponds or lakes. It is both gregarious and social, mingling with other large shorebirds.

Remarks. During the 1880's and 1890's Brewster (1925: 268–269) found this bird to be a "rather common transient" in fall in the Umbagog region. It seems to have been rare elsewhere in the interior, or, at least, few records have survived. Now that the species is increasing in numbers, it is not surprising that small flocks are reported occasionally from inland localities.

The Black-bellied Plover, being more wary and traveling in smaller flocks, was not as favorable a target as the Golden Plover. It has never equalled the latter's former abundance at Scarborough. Between 1842 and 1854, Loring shot 294 of these birds there, and from 1891 to 1912, Pillsbury shot 369, his largest bags being 39 in 1907 and 36 each in 1910 and 1912.

Ruddy Turnstone

Arenaria interpres morinella (Linnaeus)

Transient, in spring, fairly common in southwestern coastal areas but diminishing to rather rare east of Penobscot Bay, and in fall, common in eastern waters, numerous to abundant westward, and rare inland.

Spring. Although a few transients arrive about May 18, most birds are seen from May 22 to June 8, and a few occasionally linger some days later. The earliest date is for a bird seen on May 14, 1938, at Scarborough, and the latest for one seen on June 15, 1927, at Cape Elizabeth (Norton).

Fall. These birds first appear about July 27 and are abundant at suitable localities from August 5 to the end of the month, with rapidly decreasing numbers present to September 11. Although N. C. Brown (1882f: 24) stated that the "old birds" returned about mid-July, the earliest record I have at hand is for a bird seen by Norton on July 23, 1908, in "Washington County." Late dates are: three seen on September 15, 1897, at Seguin (Spinney); and, "about half a dozen" seen on September 18, 1938, at York Beach, York County, and an immature bird shot on October 29, 1884, near Hay Ledge, off St. George, Knox County (Norton). Inland, for the Umbagog region, Brewster (1925: 275) gave three records of which the earliest, for two birds shot on August 27, 1896, and the latest, for one shot on September 8, 1880, are for Oxford County.

Ecology. This gregarious species is chiefly a bird of the outer rocks and beaches, where it feeds between the tide lines, and often is seen resting in compact flocks above high tide line.

Remarks. This bird seems not to have suffered heavily by shooting in past decades. The fact that it is not as good a bird for the table compared to many other shorebirds, may have been a factor in its favor during the period of unrestricted gunning. Eventually the species may be found to occur as a non-breeding summer resident.

The Turnstone feeds on small mussels (*Mytilus edulis*) and barnacles (*Balanus balanoides*) (Norton, 1909f: 440), also on other mollusks and small crustaceans.

"It is true that the Turnstone will quickly turn over a shell or pebble with his oddly shaped bill in his search for food, this habit being characteristic and generally known to students of ornithology, but his unique peculiarity of rooting, if I may so term it, is something I have never seen him given credit for by any observer of bird life. I use the word rooting advisedly for his procedure is nothing else (unless you were to call it shoveling) and resembles the *modus operandi* of the pig when searching for food beneath the surface" (Noble, 1904d: 58).

Early reports of breeding in Maine, by Audubon (1838: 31–32) and DeKay (1844: 216), are erroneous.

Family SCOLOPACIDAE

American Woodcock

Philohela minor (Gmelin)

Summer resident, numerous in Washington and Hancock Counties and common westward, but diminishing to occasional in extreme northwestern and northern Maine; *transient,* in spring and fall, common to numerous in coastal counties and common in northern Maine; *winter resident,* occasional in coastal counties and perhaps elsewhere.

Spring. Although most migrants usually arrive in early April, in some years, many are noted all along the coast during the last ten days in March. Sizeable migration waves have been noted in the Portland-Scarborough region in different years from March 17 to April 7. There are at hand several March 13 records, apparently for migrating birds, in different years. Mendall and Aldous (1943: 43) stated that, in 1939, when weather was especially favorable for these birds, migration began by March 2 and 6 in eastern coastal areas. Transients have been noted at Presque Isle from April 19 on (Chamberlain), but probably arrive earlier. Migration continues well into April.

Fall. There is considerable wandering, probably in search of food, before migration begins. Largest southward movements occur from very early October to about November 10 to 17, the time within this period being dependent on changes in weather. During warm autumns, many large flights have been noted in the first half of November (ibid. 45). Small flights are sometimes reported in Cumberland County until November 26 or later (Norton), there having been one on November 28, 1883 (Rogers). It even may be that some of the birds seen in early December in coastal counties are migrants rather than winter residents.

Breeding. Breeding data in the thorough study done in Washington County by Mendall and Aldous (1943), which greatly adds to the Maine data in Pettingill (1936), are here summarized.

A clearing of almost any size in woods or bushes is the ideal 'singing ground' for the male. It should have slight ground cover (grass, weeds, bushes), be level or slightly sloping, and located within 100 yards of the male's diurnal territory and the nesting cover. Preferred nesting sites are in young, open, second growth mixed hardwoods and conifers or hardwood stands, with areas containing alders a second preference. Hardwood stands of beech-birch or beech-birch-maple, while common, are seldom utilized, probably because earthworms are scarce in such areas.

Copulation apparently occurs on the 'singing ground.' The evidence indicates that the species is monogamous. The nest is a shallow depression in the soil or litter, generally with no protective cover near it. A few deciduous leaves, conifer needles, small twigs, and blades of grass are added to the cavity in varying amounts, there being more when a nest is in a damp situation. Four eggs ordinarily make a first clutch, the sets of three often found late in the season (June) probably indicating that one or two earlier clutches have been destroyed. An egg is laid daily, and incubation, beginning when the last egg is laid, is by the female and requires 19 to 22 (average 21) days.

In eastern Maine, most nesting begins the third week in April and most young hatch from May 11 to 25. [These data agree with all other available data for Maine, April 26 being the average date when clutches are completed throughout.] Young are brooded in the nest for a few hours until they are thoroughly dry, then are led away by the female who takes care of them. The female feeds earthworms to the young before they begin to probe for this food themselves. The young can fly short distances when 14 or 15 days old and, at three weeks, can fly nearly as swiftly and steadily as adults. Nearly full growth is attained in 25 days. A single brood is raised yearly.

Winter. The Woodcock has been reported between December 1 and March 1 about once in four years in coastal counties. In one or two instances, birds found in January or February have been reported as enfeebled and probably unable to survive until spring. Norton (1908b) listed some of the older known occurrences. Although he had had reports from several Cumberland County sportsmen that they had seen this species on unrecorded winter dates, he omitted mention of these on the grounds that they were too indefinite. What the Woodcock eats at this season in Maine is unknown.

Ecology. The nesting habitat, described above, is resorted to from very early spring into July. In late summer and fall, alder and other lowland hardwood thickets are favored, but the species also occurs in lesser numbers in many other places, including dry wooded uplands. The wintering birds have been found about springs and very shallow water in running brooks. Transients occasionally are seen on offshore islands. This bird is somewhat gregarious during migrations.

Remarks. The Woodcock was given legal protection about as early as any bird in Maine. Changes in closed time, as listed in early public laws, were: March 1 to July 1 (1863), February 1 to September 1 (1870), January 1 to July 4 (1874), and December 1 to September 1 (1876).

In the 13 years, 1842 to 1854, Loring shot 2,163 Woodcock, probably all in Cumberland County. In the 37 years, 1865 to 1902, Rogers shot

1,218 birds in the same area, usually 35 to 80 birds a season, except in 1883 when he bagged 104; in 1886, he wrote in his shooting journal: "Woodcock seem to be getting permanently scarce." One year, probably in the early 1870's, Everett Smith bagged 94 birds with 100 shots, July 15 to 19, in Cumberland County. Pillsbury shot only 107 birds in all in the 21 years, 1891 to 1912, but in 1911, E. Field bagged 124; these Woodcock probably were all shot in Cumberland County, although possibly some in adjacent parts of York.

Austin (1885) stated that, 20 years earlier, there were few Woodcock hunters, but that currently there were 40 in Portland and as many more in other parts of Cumberland County. He wrote: "I have heard of 1,100 Woodcock shot in Cumberland County in 1869, 500 of them by two market gunners, . . Their covers were mostly in Gorham and Standish." The two market gunners may have been S. Skillings and F. Bailey. The former told Norton that, in one season between 1875 and 1885, the two shipped 630 birds by express to Fanueil Hall Market in Boston. Early in the season, birds sold for 50 cents each and dropped to 40 later. (Grouse then brought 35 cents and snipe 20 to 25.) Skillings' biggest daily bag was 22 birds. The two men, using No. 9 shot in muzzle-loading shotguns, would 'work' a cover with the aid of dogs, then return to their buggy and drive to the next cover, hunting from dawn till dusk.

Blodgett (1893) reported poaching about Ellsworth, Hancock County, and stated that the birds were bringing a dollar each in the Bar Harbor market. Hackle (1907) reported a bag of 40 birds for two men in one day near Auburn, Androscoggin County. In early 1928, Pillsbury told Norton that there had been better Woodcock shooting in Cumberland County for the preceding five autumns than in the 35 before. The hunting pressure was so great, however, that the general population trend of this species was downward, and continued so until very restricted open seasons (or none at all in some years) had to be imposed to save the remainder of the birds.

In the Gulf states, the main winter range of the Woodcock, there were two periods of unusual cold, with snow and sleet, in the winter of 1939–40; a 1940 'singing ground' census on an area in eastern Maine showed a 37.5 per cent decrease from that of the preceding year (Mendall and Aldous, 1943: 162–165). The reader is referred to this paper for information on some large bags in recent years, and for a discussion of the necessary procedures for maintaining a satisfactory Woodcock population.

The following data are from their findings (ibid. 13, 15): although there is an overlap in weights of the sexes, those weighing 230 grams (8.2 ounces) or more are females, and those weighing 150 grams (5.4

ounces) or less are practically always males; birds with bills 72 mm. (2 3/16 inches) or more in length are generally females, and those with bills 64 mm. (2½ inches) or less are nearly always males, though there is an overlap of the sexes in between, with birds having bills 67 to 69 mm. about equally divided as to sex.

European Woodcock

Scolopax rusticola Linnaeus

Erroneous report. The statement of J. A. Allen (1886: 265), that there were "records of its occurrence" in Maine, is not based on any known occurrence or capture. Forbush (1925: 385) found no New England "record" substantiated by a specimen.

Wilson's Common Snipe

Capella gallinago delicata (Ord)

Transient, common in fall and fairly common in spring throughout; *summer resident,* probably fairly common in eastern and northern counties, and uncommon on higher elevations of western counties; rare in *winter.*

Spring. This bird has been seen at points from Cumberland to Aroostook County as early as April 14. Occurrences on March 15 and 24 of unstated years at Presque Isle (Chamberlain) might possibly have been for wintering birds. Other early occurrences are: March 21, 1931 (F. Morgan), and March 28, 1878 (Smith), at Scarborough; April 6, 1910, at Cape Elizabeth (Norton); April 7, 1911, at Scarborough (F. S. Walker); and April 11, 1897, at Seguin (Spinney). Migration is still in evidence in southwestern counties to at least May 8.

Fall. Although scattered August records for Scarborough may represent summering birds or premigratory wanderers, the number of birds seen there by September 4 would indicate that migration has started by then. In some past years there, snipe shooting has been fairly good by September 12, although the main flight arrives in early October. This bird has occurred as late as October 20, 1918, on offshore Monhegan (Wentworth *in* Jenney, 1919: 26), and formerly was shot frequently until November 10 at Scarborough. Later dates, all for the Scarborough region, are: one shot on November 11, 1881, and another on November 14, 1876 (Rogers); one seen on November 15 or 16, 1907, another on November 20, 1909, and one shot on November 21 of the same year (Norton); and several seen on November 27, 1919 (E. Beal).

Flight years. Data are very fragmentary, but show that snipe were relatively abundant at Scarborough in the fall in *1868* and *1875* (Rogers), *1921* (C. Phinney), and *1934* (D. McGilvary). There were "very few" at Scarborough in 1866 (Smith).

Breeding. Although this bird apparently is fairly common in summer in eastern and northern Maine, and has been seen occasionally even in York and Cumberland Counties, I find only three instances of eggs having been found. L. Clark and Mendall found a nest with four eggs on May 19, 1946, at Calais, in the Moosehorn National Wildlife Refuge. It was located in a wet swale bordering Howard Mill Stream, being only two feet from standing water in a pool and 12 yards from the stream, and on a mossy hummock, elevated only an inch above water level. It was shallow and consisted of a little dry grass, and was partly concealed in a clump of *Calamagrostis* sp., *Spiraea latifolia*, and *Carex* sp. About June 1, the nest was destroyed by some predator. The site here described is fairly typical of those reported outside of Maine. The late Walter Clayton found a set of eggs near Lincoln, Penobscot County, but data on these are not at hand. Shells of four eggs that probably had hatched about the last of May were found on June 17, 1948, at Portage Lake, Aroostook County (Mendall).

The clutch (four eggs) has been found, in Quebec, to require 20 days' incubation (Mousley, 1939a: 131). The fledging period apparently is unrecorded. A single brood is raised yearly.

Winter. Occurrences for this season are: one seen on December 7, 1921, at South Portland (C. Phinney); near a spring in spruce woods at Brunswick, Cumberland County, on December 15, 1928, when snow had been on the ground for some time, I shot a bird on the wing that I found to be apparently healthy upon skinning it; three or four seen a few days before February 28, 1930, at Fore River, Portland, and one of them caught, being unable to fly, but when liberated the next day, it flew off (F. Isley); one found dead on February 28, 1946, at Eliot, York County (S. Hawkins); and one seen on March 5, 1934, and thereafter, near Presque Isle (Chamberlain, 1935: 316).

Ecology. The summer habitat is fresh water marshes—even very small ones that are largely grown to clumps of alders—and bogs. During migration, they are found in a variety of places, among which are salt and fresh water marshes, swales and low alders and muddy banks along watercourses, puddles in fields, and, occasionally, even in damp but rather open woods.

Remarks. Like the Woodcock, these birds could not maintain their numbers in the face of heavy gunning. The result was a steady decline in the population for many years. There was a very small flight in the spring of 1941 (Eckstorm, Weston), and in the following autumn,

for the first time, there was no open season. The species has increased slightly in eastern Maine since 1943, but its numbers are still low (Mendall).

Boardman (1869b) wrote that he had observed Snipe to perch in trees when being robbed of eggs or young. For the same region, Bond wrote in a recent letter: "On the Calais marshes I once observed a snipe cackling on the top of a telephone pole. When flushed it flew to the top of a nearby pole. I am certain it had young nearby." In Brewster's (1925: 232–240) many notes on the habits of these birds in the Umbagog region, he described the interesting 'winnowing' courtship flight in autumn.

Southern Long-billed Curlew

Numenius americanus americanus Bechstein

Four records (one spring and three fall) and reports of occurrence.

One was shot on May 2, 1866, at Scarborough (Smith, 1882–83: 85). The three fall records, also for Scarborough, are: one shot on August 15, 1866, and another on August 13, 1869, both by Rogers (Norton); and, on September 2, 1939, "I flushed two very large curlews. They flew a short distance and came down on the marsh again at a distance too great to observe them well. Size, color, and head markings were typical of the Long-bill and I do not hesitate to call them such" (C. K. Nichols).

N. C. Brown (1882f: 29) wrote, "I have seen it only in August," in the Portland-Scarborough region, and Smith (1882–83: 85) listed it as an occasional "visitant in summer" (meaning late summer). Knight (1897d: 51; 1908b: 183), on authority of Spinney, gave its status as "very rare in August" in Sagadahoc County.

Remarks. Loring, in his shooting journal, made a distinction between "Curlew," "Jack Curlew" [Hudsonian], and "Dough bird" [Eskimo Curlew]. It is likely that at least some of the 15 birds he listed under "Curlew," and which he shot at Scarborough between 1842 and 1854, were Long-bills.

For the Calais region, Boardman first (1862: 129) stated that the Long-bill occurred in spring and fall, but later (*in* Baird, Brewer, and Ridgway, 1884, 1: 313), he changed this to occurrence only in August, and still later (1903: 311) to a status of "Very rare." The basis for these statements may have been occurrence in either Maine or New Brunswick.

Norton's Knox County citation (*in* Knight, 1897d: 51) proved, on reexamination by him, to be based on a large Hudsonian Curlew.

Hudsonian Whimbrel; Hudsonian Curlew

Numenius phaeopus hudsonicus Latham

Transient, rare in spring and in varying numbers (to occasionally common) in fall coastwise and very rare inland.

Spring. Of this bird in the Portland-Scarborough region, N. C. Brown (1882f: 29) wrote: "Arrives from the south about the 20th of May and passes immediately onward." I find only three specific records, however, and these are: May 23, 1895, at Seguin (Spinney); May 15, 1934, at Scarborough (Norton); and June 8, 1942, at Medomak, Lincoln County (Cruickshank).

Fall. Transients generally are seen on the coast and islands from July 19 to September 20, the majority of them occurring during the last half of August. Early records are: a female shot on July 6, 1883, on Metinic Island, Knox County (Norton); one shot on July 8, 1868, at Scarborough (Smith); and one seen from July 12 on, 1938, at Popham Beach, Sagadahoc County (Palmer). There are a number of occurrences from July 16 to 19. The species is seen rarely in early October. Rackliff told Norton that these birds were "common" at Corea, Hancock County, from November 9 to 15, 1910, and showed him one shot in that period.

Inland, one was seen by Weston on August 15, 1945, at Brewer, one was shot on September 18, 1888, on the New Hampshire side of Lake Umbagog, as reported by Brewster (1925: 267), and another was shot on October 12, 1898, at Black Stream, south of Dover-Foxcroft, Piscataquis County (Ritchie *in* Knight, 1908b: 184).

Ecology. This bird usually is found on beaches, mudflats, in 'pond holes,' and where vegetation is rather sparse in marshes. In July and August, many alight in grassy fields or where grass has been cropped low by sheep, and among heaths (habitats quite similar to their breeding grounds) along the coast and on islands. According to Frank Trevor, flocks of these birds and of Black-bellied Plovers come to Mosquito Island, St. George, Knox County, in late August, and feed together on grasshoppers and flying ants in the areas grazed by sheep. Flocks have been seen in blueberry fields in Washington County, especially at Petit Manan Point. Here they are called "Blueberry Curlews"—pronounced "Clews." Weston, who has observed the birds there, is not certain that they eat the blueberries rather than the insects. They eat crowberries (*Empetrum nigrum*) elsewhere 'down east.'

Although this curlew mingles with other birds when feeding, it is not particularly social towards any shorebird now commonly occurring in the state.

Remarks. Most of the spring migrants on the Atlantic coast fly inland before coming as far north as New England. The normal fall route of most of these birds appears to be from Nova Scotia across the Gulf of Maine to Cape Cod. The variable number of birds inshore at this season can be accounted for by the effects of weather conditions on the offshore flight. Numbers may be expected ashore during periods of bad weather. From available data, it appears that even in the decades before much shooting, this curlew did not come into coastal areas in large numbers. Former shore gunners, adept at 'calling up' curlews to get them within gunshot range, found the best shooting to be on the outer islands. These are still the most favorable places to observe the fall migration. Ordinarily, fewer birds are reported from the coast east of Penobscot Bay than west of it.

Formerly the most common associate of this species was the Eskimo Curlew which was the more numerous of the two but is now perhaps extinct. The Hudsonian has been increasing for at least 15 years.

Eskimo Curlew

Numenius borealis (Forster)

Nearly extinct. Formerly an abundant fall transient across the Gulf of Maine and irregularly common to abundant along the coast and rare inland; one spring record.

Spring. Boardman (1862: 129) listed occurrence in the Calais region as: "Fall and spring. Rare." W. A. Squires, of the New Brunswick Museum, wrote in a letter of November 30, 1946: "you will be pleased to learn that the Eskimo Curlew [specimen] I mentioned was taken at Calais by Boardman or some of his friends in May, 1891. This is the only spring record that I have for the species."

Fall. The flight usually passed from about August 27 to September 11, with a few birds coming later. N. C. Brown (1882f: 29) wrote: "Arrives [in mid-August] with the Golden Plover, with which it usually associates." Late records include: a female shot on September 23, 1901, at Scarborough (Forbush, 1912: 430), and now in the Museum of Comparative Zoölogy; and, on September 27, 1885, Norton saw several birds that had been shot a few days earlier by Rackliff on Little Green Island, off western Penobscot Bay. Having received specimens from Maine, C. L. Bonaparte (1833: 126) wrote that the species was "common in Maine and Nova Scotia during the months of October and November." Rackliff told Norton that these curlews sometimes occurred at the Green Islands, off western Penobscot Bay, "late in fall," probably meaning October and November.

Flight years. "Great numbers of curlews migrate along the coast of Maine far out at sea, and only appear here upon the land when heavy weather causes them to pause in their flight and come to the shores" (Smith, 1882–83: 85). In *1877*, there was a flight of thousands on August 27 and 28 at North Yarmouth, Cumberland County (N. C. Brown); in *1878*, after a southeast wind and heavy rain all day on August 25, the weather cleared in the evening and a great flight came to Scarborough, Pillsbury and I. Crocker shooting 31 birds with four shots, but when many gunners went out the next day, the flight had passed (Smith); in *1879*, during a September gale, "thousands" alighted about a pond in South Portland (S. D. Rummery); and in 1878 or 1879, L. C. Daniels and J. Martin found a "remarkable flight or abundance," on a fall day, at New Gloucester and Falmouth, Cumberland County (H. H. Brock).

Remarks. On the authority of Wallace Homer, Knight (1897d: 51; 1908b: 184) listed this species as having occurred inland in Piscataquis County. A record which might be considered inland is for a specimen shot on August 31, 1880, in the vicinity of Bangor (Hardy). There is also a sight record, for a bird not identified beyond doubt, on September 11, 1880, at the mouth of the Cambridge River in Oxford County (Brewster, 1925: 268).

Occurrences in Maine after 1900, in addition to the one listed under Fall, are these: a "few" were shot on September 9, 1905, at Scarborough, and a flock of 14 was seen (some shot) there on September 3, 1907 (Pillsbury). On March 23, 1939, the late Paul F. Eckstorm wrote to Norton, in part, as follows: "It is said that four were taken about 1936 at either Schoodic Point or Corea, Hancock County. My informant took one, his boatman the other three. He knows shorebirds and knows the Hudsonian Curlew. The birds were not preserved, but I feel sure of the record." I have been able to trace this incident, and learned from Eckstorm's informant that the locality was Schoodic Point and the date August 28, 1929. A competent student of birds who must remain anonymous, the informant dined with others on these small curlews. On becoming curious as to the identity of the birds, he examined the wings, which had been tossed out with garbage, and established that at least some of the wings were from Eskimo Curlews. Considering the illegality of taking any species of curlews at that time, it is easily understandable why the evidence was destroyed.

The 1877 flight, mentioned above, is well chronicled in an unpublished letter, dated September 5, 1877, which N. C. Brown wrote to Ruthven Deane. This reads, in part, as follows: "On the 27th day of August, word was brought to one of our sportsmen that many large

plover were flying about a field in North Yarmouth, which is a small town situated N. E. of Portland and several miles from the sea. The gentleman took his gun and repaired to the field, in expectation of getting some Upland Plover shooting. To his surprise, however, he found a large flock of Esquimaux Curlew, and after bagging fourteen birds he returned to town and notified five of his friends who agreed to accompany him to the field the next day. . . On the morning of August 28th upon reaching their ground, an undulating stretch of 'grassland' about a mile and a half long and three-quarters of a mile wide, they discovered the curlew feeding in a patch of clover, their numbers swelled by fresh arrivals since the day before, and now aggregating several hundred individuals. A plan of operation was devised and in process of execution when another immense flock of birds appeared in the N. E., passed over the gunners' heads and with slight hesitation alighted in the grass not many rods distant. And this was but the vanguard. All day great masses of birds kept coming from the N. E., circled over the fields and only withdrew after they had been repeatedly shot at. One of my friends says that a flock of fully a thousand individuals passed over him at one time as he lay in the grass. I have spoken of the birds generally as curlew, and nine tenths of them were Esquimaux Curlew (*N. borealis*) . . .

"The ground was revisited on the following day but only a few birds were found."

About 1880, the Parker House and other Boston hotels paid Cumberland County gunners a dollar per bird for Eskimo Curlews (G. Cushman).

Knight (1910b) reported one of these curlews, taken on September 2, 1909, at Hog Island, off Brooksville, Hancock County, that he saw as a mounted specimen in the collection of the University of Maine. Mendall and I have examined this bird and found it to be a small Hudsonian Curlew. Forbush (1912: 430) reported another shot at the same place on September 14, 1909, and preserved. There is a second small Hudsonian, without data, in the University collection, and very likely the specimen referred to by Forbush.

Bartramian Sandpiper; Upland Plover

Bartramia longicauda (Bechstein)

Summer resident, occurring in small numbers at a few localities in Cumberland, Androscoggin, Kennebec, and Penobscot Counties, and perhaps elsewhere from the Penobscot drainage southwestward; one spring record for Mt. Desert Island.

Spring. For the Portland-Scarborough region, N. C. Brown (1882f: 28) wrote: "Arrives in the latter part of April. My observant friend, Mr. A. G. Rogers, has seen it the 16th (1866) of that month." The species has been noted on April 19, 1896, at Gardiner, Kennebec County (Royal *in* E. H. Norton, 1902); on April 26, 1904, at Westbrook, Cumberland County (Norton *in* Sweet, 1905c: 61); and one was collected on April 27, 1942, at Otter Creek Village on Mt. Desert Island (Bond). On April 29, 1942, Weston saw six of these birds at Corinth, Penobscot County, and was told by a farmer that they had been there for nearly two weeks.

Fall. This species is "among the first of its tribe to leave for the south, but few individuals remaining after the first week of September" (N. C. Brown, 1882f: 28). Later dates are: one shot on September 16, 1865, at Scarborough (Rogers); and birds heard migrating at evening on September 18, 1889, at Westbrook (Norton). Smith's statement (1882–83: 85) that "but few, if any, remain until the month of October" may indicate later occurrence at a time when the species was more plentiful.

Breeding. This bird nests "upon the ground in fields and pastures, and lays four or more buff eggs . . . late in May and early in June." (Smith, ibid.). There is a set of four eggs, that were fresh when taken on May 24, 1879, at Dresden, Lincoln County, in the American Museum of Natural History. C. S. Winch found a nest on May 28, 1912, and collected four eggs from it on the 31st, at Corinth. Four eggs, advanced in incubation, were found on May 30, 1890, at Pittsfield, Somerset County, by C. H. Morrell; two of these were broken, and the other two are now in the U. S. National Museum. G. M. Allen (1909: 82) reported "eggs" taken on "June 6" of unstated year and locality. On June 7, 1925, Norton found a nest at Gorham, Cumberland County; it was a depression, lined with grass, in a pasture, and contained four eggs.

In Wisconsin, the incubation period had been reported as 21 days and fledging 30, both parents tending the young (Buss and Hawkins, 1939: 210, 215). At Corinth, Weston found a young bird not quite old enough to fly on July 26, 1942, and the two of us saw several young on July 20, 1946, which could not have been flying for more than a very few days. One brood is raised yearly.

Ecology. During spring and the breeding season, this bird is found in pastures and hayfields, particularly the latter, having a fairly rank growth of grass. "During the latter part of August, they commence to wend their way toward the south, moving in small flocks from the inland breeding places to the marshes and fields along the coast" (Smith, 1882–83: 85).

Remarks. There is some slight evidence that this bird nested on coastal islands in early times, but its early history is too obscure to furnish any details. For the state's 16 counties, Knight (1897d: 50) listed it as a common summer resident in 13 of them, as "common" in Aroostook and Waldo, and stated that there were summer records for Knox. This unwary bird was much sought after by gunners in August, however, so that in Knight's later work (1908b: 178), he listed it as known to nest in only seven counties, to be rare in Kennebec, Knox, and Sagadahoc, "seemingly not common" in Waldo, "accidental" in Washington, and entire omission of Aroostook, Hancock, Lincoln, and York. By 1912, the species was rare in the Portland-Scarborough area, even on marshes in August. The records for the state were few indeed from then until after 1920. Although these birds may not have nested in some years, it seems likely that a few pairs were present every year.

In 1920, Walter Blanchard told Norton that some had nested on a farm between Yarmouth and Walnut Hill in Cumberland County. About a dozen were seen by Norton on August 16, 1924, at Gorham in the same county. The numbers occurring in summer at Gorham and Yarmouth have increased slowly, as they have at a few other localities. In the vicinity of Auburn, Androscoggin County, the species reestablished itself about 1932, and now occurs regularly in small numbers. They are again seen occasionally on the Scarborough marshes in August and, in general, seem to be increasing.

The small colony at Corinth has existed, despite former gunning, for many years. C. S. Winch used to hunt them there regularly. Specimens taken by him and E. R. Gross, in August, 1909 and 1910, are in the collection of the University of Maine. Numbers seen there in the past decade by Weston are as follows: four on August 6, 1939, and July 26, 1940; six on July 15 and fifteen on August 10, 1941; six on April 29 and twenty on July 26, 1942; fifteen on August 6, 1944; twenty on July 24, 1945; and twelve on June 20, 1946.

Spotted Sandpiper

Actitis macularia (Linnaeus)

Summer resident, fairly common throughout, including offshore islands; *transient*, common to rather numerous in spring and fall; one *winter* record.

Spring. This species usually arrives at points eastward to the Penobscot drainage from April 27 to May 4, and generally is found throughout by May 11. Early arrival dates are: April 14, 1904, at

Westbrook, Cumberland County (Norton *in* Sweet, 1905c: 61); April 19, 1933, at Gardiner, Kennebec County (G. Reeves); April 24, 1891, at Westbrook (Norton); and April 25, 1920, at Sebago Lake, Cumberland County (Haven). It arrives at Presque Isle from May 9 to 16 (Chamberlain).

Fall. Some movement is noticeable by July 20 and migration continues to about October 3, with a few birds rarely lingering until the 12th. Later records are: a crippled bird, October 15, 1903, at Westbrook (Norton); October 18 occurrence in the Umbagog region (Brewster, 1925: 265); one seen on October 21, 1937, at Kezar Pond, Fryeburg, Oxford County (Dr. H. Maynard); and November 19 of unstated year and locality (G. M. Allen, 1909: 83).

Breeding. The nest, a slight depression in the ground, is lined with grass, and generally sheltered by some vegetation (see Ecology). Nest building has been observed on May 14, 1890, at Westbrook (Norton); May 14, 1896, at Lake Umbagog (Brewster, 1925: 267); and June 19, 1931, on Mt. Desert Island (Mrs. E. A. Anthony). In the literature and among unpublished data (especially that of Norton and Harris), are records of 27 full clutches (four eggs) found on the coast and islands and in the interior. Dates range from May 21 to June 26, with most being from May 28 to June 9. "Exceptionally, fresh eggs have been found near Orono [Penobscot County] as early as May 20 and as late as July first" (Knight, 1908b: 182).

In Michigan, the incubation period has been determined as 21 days, incubation and brooding are by the male only, and the chicks leave the nest shortly after they are dry, making short flights at 16 days of age (Nelson, 1930). Of perhaps a dozen broods which I have observed, in only one instance did I see two adults accompanying the chicks. One brood is raised yearly.

Winter. One bird, apparently healthy, was seen on February 17, 1930, on Long Island in Casco Bay (J. R. Wallace).

Ecology. In migration and summer, these birds often are seen on sea beaches, and at the water's edge on rocks, flats, and about tide pools. Inland, they frequent muddy banks and low grassy places, or, if the water is high in spring, they are seen mainly on rocks, stumps, floating debris, and log booms, the last named being a favorite feeding place throughout the summer. On coastal islands, the preferred nesting site is the edges of turf facing the water, though other grassy parts are used. On beaches, nests are placed in the shade of a clump of grass, a log, or debris, where it is rocky, sandy, or grassy. Inland, they are partial to islands in rivers, ponds, and lakes. The nest is usually shaded by plant growth which often is tall and dense, but not trees. If a shore is wooded nearly to the water's edge, with only a

narrow strip of grass, the nest is placed as far away from the trees as possible. Occasionally a bird will nest in a sandy area remote from water, as at Freeport and Brunswick in Cumberland County. On farmlands, they often nest where there are fields and pastures sloping toward a stream or pond.

In spring, these birds are decidedly less active on cold and cloudy days. They do not always seek shelter during a rainstorm, but may stand in the open on logs or rocks in the river. Some were observed to go under an overhanging bank or other projection during a downpour. They seem to prefer a certain amount of openness at all times and usually will avoid alighting where dense plant growth comes nearly to the water's edge. If one is cornered in a cove, however, it does not hesitate to flit off through the trees or bushes to circle back to the river.

The species is somewhat gregarious, even during courtship.

Remarks. Norton mentioned in his notes repeatedly that this species became less numerous along the coast and on islands in the decades following 1900. It is not known whether a similar decline occurred inland. For about the past decade, however, the coastal breeding population has shown some recovery.

Following are some observations made during a study of these birds near Orono in 1936 and 1937. The first birds to arrive, usually May 2 to 4, are females and the numbers increase for over a week thereafter. The first males arrive about May 8 to 10, and reach their peak numbers about a week later. After about May 20, the population decreases slightly, indicating that transients have departed and breeders remain. The two-noted 'peet-weet' is heard from the earliest arrivals, and, with the arrival of the males, the many-noted 'peet-weet-weet'-etc. is very noticeable. At this time the birds are still gregarious to some extent and the so-called scaling flight is first observed. This consists of a bird's flying just above the water's surface, then rising to a height of three or four feet—flying slowly with wings moving stiffly through a small arc—and then scaling abruptly downward to a landing. The wings seem to vibrate and the bird utters the continuous call on the downward part of the flight. This usually is done when one bird is joining another, but not necessarily so.

I have observed these birds to alight in trees under several different circumstances. The most common was when a bird was concerned for the safety of the young. Other times were when a bird was driven from its territory. I used to flush birds from shore, and, as they went farther upstream out of their territory, they became more and more alarmed. A bird would circle about, returning to its own area, and, on being forced out again, would sometimes alight in a tree. Once I

came upon a bird which was perched quietly on a twig about four feet above ground. Nestlings were found there several days later.

Adult birds swim very well on the surface when wounded, propelling themselves by their feet. If a wounded bird is approached closely, it dives and propels itself by means of half opened wings, the feet trailing and not being used in any instance which I have observed. The young in natal down swim well, using their feet, and are not at all hesitant about entering the water. They dive readily, but soon become thoroughly wet or exhausted. Birds in juvenal plumage occasionally use both wings and feet when swimming beneath the surface.

They are very active feeders. If an insect floats by, in deep water and just out of reach, the bird will support itself by its wings while securing the passing object. The crops and gizzards of ten specimens which I collected were examined by C. C. Sperry, of the U. S. Fish and Wildlife Service, and I have examined 38 additional ones. It is evident that the diet is almost entirely animal matter, at least in the region studied. Of the insect material, which comprises the bulk, the five most important orders are: Coleoptera, Hymenoptera, Diptera, Hemiptera, and Ephemerida. Coleopterids were taken in greater bulk and numbers than the other four Orders combined. There was a trace of gravel and of vegetable matter in most stomachs.

Trying to distinguish the sexes in the field did not produce satisfactory results, as proved by shooting the birds. On the average, females are much more heavily spotted than males. There is much variation, however, with perhaps 25 per cent of the females no more heavily spotted than some males. Generally males have fewer spots on the abdomen and under tail coverts, the latter being unspotted in quite a few individuals. As to bill color, this varies from yellowish to pale flesh color to pinkish in freshly killed spring birds of either sex. The tarsi vary from olive to gray to pale vinaceous pink, usually tending toward gray in males, and being somewhat brighter colored in females.

Eastern Solitary Sandpiper

Tringa solitaria solitaria Wilson

Transient, in spring and early summer, common in western and northern counties but decreasing to somewhat rare in eastern coastal counties, and, in late summer and fall, common in northern Maine and from the Penobscot drainage westward but uncommon in coastal counties farther eastward. Possibly a few linger all summer, but reports of breeding are erroneous.

Spring. The Solitary usually arrives in southwestern Maine by May 10, and often by May 7 or 8. It arrives in Presque Isle from May 13 to 19 (Chamberlain). The migration is at its height from about May 17 to 28, and some individuals linger until June 10 and a few even later. In some springs, when high water in streams and ponds covers the shallow feeding places where this bird feeds, until well into May, most transients pass by without stopping.

Fall. The species is found regularly in suitable places by July 20, and rarely by the 13th. Most are seen from August 5 to September 10, with stragglers noted throughout the remainder of the month. Early October records are few, but there are these later ones: one seen on October 19, 1903, at Back Cove, Portland (Norton); October 20, 1906, at Hebron, Oxford County (Johnson *in* Brownson, 1907e: 70); October 20 of unstated year in the Umbagog region [? Me. or N. H.] (Brewster, 1925: 260); October 21, 1904, at Westbrook, Cumberland County (Norton *in* Brownson, 1906c: 62); and one shot on October 22, 1868, at Scarborough (Rogers).

Flight year. In May, *1893*, this species was unusually numerous at Scarborough (Norton).

Ecology. For the Umbagog region, Brewster (1925: 261–262) wrote: "Here as elsewhere they prefer, to all other haunts, rather narrow stretches of very soft, if not semiliquid, mud quite barren of vegetation, but closely approached on the one hand by lines of trees or bushes, living or dead, and bordered on the other by shallow tepid water into which they love to wade up to their bellies. Scattered along such a shore, perhaps not exceeding twenty rods in length, they may often be seen to the number of a dozen or more, searching for food industriously, but very deliberately, obtaining some of it from the surface of the mud, and some by probing after the manner of Wilson's Snipe, but more listlessly."

Coastwise they are found in brackish pools near woods or bushes and much less often in similar pools in extensive open marshes. When flushed from river bank or lake shore, they frequently fly off through the trees. Transient birds occasionally are found at sheltered places on offshore islands, including Monhegan, usually in August or early September.

Remarks. The belief that this species nested in Maine apparently began with the statement by Boardman (1862: 129) that it bred in the vicinity of Calais. Smith (1882–83: 85) stated that some remained all summer and probably bred. In his later list (1903), Boardman omitted mention of breeding. Knight (1897d: 49) stated that, "while they doubtless breed I cannot positively state that such is the case." Later, Knight (1908b: 174–175) alluded to breeding in a more definite

manner, and stated that he once found downy young. Actually his record is negated by the fact that his description of chicks fits the Spotted and not the Solitary Sandpiper. Norton found no downy young of either species in Knight's own collection.

There are no data indicating whether this species has changed in numbers in Maine in past years.

Data on ten adult females, which I collected in spring and fall, mostly in Penobscot County, are: weight, 56.9 grams (42.2 to 66.6); chord of wing, 134.5 mm. (128 to 143); length, in the flesh, 216 mm. (208 to 229). Four males: 53.7 grams (44.6 to 57.8); chord of wing, 132 mm. (129 to 137.5); length, 215 mm. (209 to 225). A female, shot on May 20, 1934, at Old Town, Penobscot County, had its gizzard filled with a Chrysomelid beetle (*Donacia rufa* Say), which feeds on Arrow-head (*Sagittaria* spp.).

The record of occurrence on April 28 of unstated year in southwestern Maine (Swain *in* W. Cooke, 1910: 59) probably is an error.

Eastern Willet

Catoptrophorus semipalmatus semipalmatus (Gmelin)

Transient, rare in spring and uncommon and irregular in fall coastwise, with one inland record for Somerset County for the latter season.

Spring. All records at hand are: one on May 9, 1878, at Moosabec Reach, Jonesport, Washington County (N. C. Brown); one on May 17, 1910 (Pillsbury), one on May 21, 1866 (Smith, 1882–83: 85), and two for several days (dates lacking) in 1900 (Norton), at Scarborough; and one shot in the spring of 1910 in Knox County (Rackliff).

Fall. Most occurrences are for August 6 to 21. Three were seen as early as July 25, 1938, in the Muscongus Bay region (A. Sprunt), and a single bird was seen there on July 28 and 30, 1937 (Cruickshank, 1938: 550). Late dates are: several seen on August 29, 1934, at Scarborough (Nichols and Nichols, 1935: 81); one seen on August 29, 1939, at Medomak in Bremen, Lincoln County (Cruickshank); one shot on September 11, 1870, at Scarborough (Rogers); and one shot on October 25, 1896, at Phippsburg, Sagadahoc County (Spinney *in* Knight, 1897d: 49; 1908b: 176).

Flight year. In *1908*, there was a sizeable flight, for so scarce a bird, from August 10 to 18 at Scarborough (Norton). In this same flight, 22 birds were shot farther westward at Newburyport, Massachusetts (G. M. Allen).

Ecology. Favored habitats in Maine are the extensive marshes in the Scarborough region and, to a much lesser degree, the marshes and

beaches at Popham Beach, Sagadahoc County. Probably the most common associate of this gregarious shorebird is the Lesser Yellow-legs.

Remarks. N. C. Brown told Norton that up to the 1870's, the Willet occurred regularly in small numbers in fall in the Scarborough region. Loring's shooting journal listed 14 shot, from 1842 to 1854, in that vicinity. After a period of scarcity, caused by shooting, the species is being seen with increasing frequency, but has not recovered its former numbers.

Inland records include a Willet heard over Big Wood Pond near Jackman, Somerset County, on August 24, 1946 (A. R. Phillips), and one shot on unknown date at Lake Umbagog (Brewster, 1925: 264). Regarding the latter, there is no way of ascertaining whether the bird was shot in Maine or New Hampshire.

From the large flight of 1908, Pillsbury shot a half dozen birds and noted that they had been eating fish.

Most of the Willets nesting in Nova Scotia apparently fly across the Gulf of Maine without coming in to our coast. H. F. Lewis (1920a: 581) cited E. C. Allen's report of arrival of this species in Nova Scotia as early as May 4, which is earlier than any of the few spring records for Maine.

Josselyn (1674; 1865b: 80) mentioned "*Humilities*" among birds seen at Scarborough. This local name has been restricted to the Willet by some authors, although Trumbull (1888: 164, 167, 173) has shown that it was applied to several different shorebirds in New England. It would seem probable that Josselyn had a Yellow-legs species in mind when he listed this name.

Griscom (1941: 59) stated that the Western Willet was rare in Maine. The basis for this statement is not known to me; all the Maine Willet specimens which I have examined have been of the eastern race. The nearest that the western race has occurred, as far as I am aware, is at Newburyport, Massachusetts.

Greater Yellow-legs

Totanus melanoleucus (Gmelin)

Transient, common to fairly numerous in spring and fall coastwise, and uncommon but regular inland; a few *summer* occurrences coastwise.

Spring. The first sizeable wave arrives between April 28 and May 4, and most birds have departed by May 28. There are several arrival dates for single birds or small numbers for April 17 to 24, plus these earlier ones: one seen on April 7, 1910 (Walker, 1911; Norton, 1911c), and two on April 12, 1871 (Smith), at Scarborough; a flock of over 50

seen on April 13, 1933, at Pleasant Point, Merrymeeting Bay (Norton); and one seen on April 16, 1933, at Back Cove, Portland (Rich). This species arrives at Presque Isle from April 26 to May 8 (Chamberlain). A few linger in the state until June 9 or even later.

Fall. Transients are noted rarely by the last week in July. Generally the first birds arrive about August 4, and they often are common by August 12. There were large numbers at Scarborough on August 5, 1898, and on August 11, 1902 (Norton). Usually there is a flight about September 10 and another in early October, the species generally occurring all along the coast until the last week in the month. Late records are: six seen on November 6, 1940, on Great Cranberry Island, Hancock County, four seen on November 7, 1941, at Prospect, Waldo County, and one seen on November 7, 1942, at Eddington, Penobscot County (all by Weston); two shot on November 8, 1879, at Scarborough (Smith); one seen on November 9, 1936 (Rich), and five seen on November 9, 1941 (W. Taber), at Back Cove, Portland; one seen on November 10, 1941, at Drakes Island, Wells, York County (G. Dunthrone); one or more seen on November 11, 1868 (Smith), and an injured bird shot on November 16, 1907 (Norton), at Scarborough; and a bird seen on November 23, 1940, at Back Cove, Portland (Rich). Brewster (1925: 256) recorded a flight of considerable size at Lake Umbagog in November, 1879, after the lake had frozen over.

Summer. A small flock remained all summer in 1868 at Scarborough (Smith). The birds occasionally seen from about June 9 until late July are probably sick or injured individuals.

Ecology. The Greater Yellow-legs, being more adaptable, is found in a wider range of situations than is the Lesser. The former feeds on tidal flats, and in shallow water about offshore islands and on the coast, as well as in pools and even in fairly dense marsh vegetation. Where water is too deep for wading, they swim readily in search of food. They generally travel in smaller flocks, being more wary, and stay farther out on the flats or marshes than does the smaller species.

Remarks. It is rather to be expected that the late and early occurrences of this species were noted before and after the period when it was much reduced in population by gunners. Under protection, it seems to have shown better recovery in numbers than the Lesser Yellow-legs.

From 1842 to 1854, Loring shot 999 Greater Yellow-legs at Scarborough. On an October day, about 1884, I. W. Pillsbury and S. Rummery fired four charges of shot (two each) into a large flock there. After bagging the cripples, they sold their catch for over $58.00 to a Boston hotel. They probably dropped at least 15 birds per shot. Both species of Yellow-legs circle about over wounded companions, thus giving

gunners further opportunity to shoot into the flock. In general, shooting journals listed much smaller annual kills of the Greater than of the Lesser Yellow-legs, as would be expected from their differences in habits.

As these birds fatten on the marshes and flats in fall, there is often a recrudescence of posturing. On September 25, 1936, Norton watched a particularly active flock at Back Cove, Portland. Their piping call was heard continually. One bird swam on several occasions. In the shallow water, one bird would rush toward another which would take flight, flying over the first bird and alighting on the opposite side of it.

This species does not breed in Maine, as was suggested by several early writers.

Lesser Yellow-legs

Totanus flavipes (Gmelin)

Transient, rare to uncommon in spring coastwise, and numerous to abundant in fall, mainly in salt marshes from the mouth of the Kennebec River westward, diminishing in numbers eastward on the coast, and regularly uncommon inland; occasional in *summer* coastwise.

Spring. May 11 to 25 are about the normal limits of spring migration. Smith (1882–83: 85) gave the following very early Scarborough dates from Caleb Loring: April 23, 1859 [misprint for April 28], and April 30, 1864. Transients occasionally are seen as late as June 6.

Fall. The first birds usually arrive about July 20, with more in early August, and a sizeable wave generally arriving at Scarborough between August 17 and 21. Most birds have departed by September 18. Loring's late Scarborough records, given by Smith (ibid.), are: one, October 10, 1864; three, October 11, 1858; one, October 14, 1881; and one, October 21, 1863. Rogers shot a bird at the same place on October 17, 1881. Tyson and Bond (1941: 59) reported an occurrence the "first week in November," on authority of A. Stupka, at Mt. Desert Island.

Summer. The birds seen occasionally along the coast in late June and early July are probably enfeebled or sick individuals.

Ecology. On tidewater, this bird feeds in pond holes in salt marshes, and follows the edge of the water across the flats as the tide ebbs and flows. Inland, it prefers shallow pools and the edges of river bars. (Also see Ecology under the preceding species.)

Remarks. This bird has not yet recovered from the heavy shooting which lasted at least five decades. Data from shooting journals of Scarborough hunters show that this species was much hunted in August. From 1842 to 1854, Loring shot 4,093 birds; year-by-year

data are not available. In the period from 1864 to 1881, Rogers shot 469 birds, his largest annual bag being 114, taken August 5 to 28, in 1872, and the smallest ones less than a dozen during each of eight different years. From 1891 to 1912, Pillsbury shot 813 birds, his largest bags being 136 in 1893, 61 in 1891, and 57 in 1905. In the early 1880's, the Parker House and other Boston hotels paid gunners 50 cents per bird for Lesser Yellow-legs.

In early August, this species frequently is seen displaying. One will chase another, with wings raised and tail spread, or occasionally hover over a pool, giving a flight 'song.'

The erroneous report that this bird probably bred in the Umbagog region, as first stated by Verrill (1862a: 152), was cited by Coues (1868: 295).

American Knot

Calidris canutus rufus (Wilson)

Transient, rare in spring and uncommon in fall coastwise, and rare inland at the latter season; two *summer* records.

Spring. Extreme dates for the few records are May 21, 1934 (Norton), and June 11, 1877 (N. C. Brown, 1882f: 26), both for the Portland-Scarborough region.

Fall. A female in nuptial plumage was shot on August 5, 1910 (Norton), and two birds shot on September 24, 1898 (Pillsbury), at Scarborough. Other occurrences are spread quite evenly between these two dates. Of the few inland records, the most recent is for a single bird seen by Pillsbury, on unstated fall date in 1935, at Seboomook Lake in Somerset County.

Summer. Two were seen on June 23, 1895, on Western Egg Rock, on the Lincoln County side of Muscongus Bay (Norton), and two were seen on June 30, 1937, at Madagascal Pond, Burlington, Penobscot County (F. Dingley).

Ecology. The Knot usually is found on open beaches, feeding on the animal life left exposed by receding waves. If several or more are present, they usually travel in close company, and single birds associate with Sanderlings and small sandpipers.

Remarks. Both Boardman (1897) and Knight (1908b: 161) pointed out that the Knot formerly was a more common bird. Since 1900, seldom have more than six or eight been seen at a time. An exception was a large flock spread out in a long line, and a smaller one which followed, seen by Norton on May 21, 1934, at Scarborough.

In his shooting journal for 1891 to 1911, Pillsbury listed 46 Knots shot at Scarborough, his largest annual bag being ten in 1896. Fall

birds are mostly immatures, which the gunners called "Gray-backs," in contrast to "Robin Snipe" for adults in nuptial plumage.

Josselyn's mention (1674; 1865b: 80) of "*Knotes*" is the earliest Maine reference to this bird.

Purple Sandpiper

Erolia maritima (Brünnich)

Winter resident, numerous on offshore rocks and islands from Washington County west to Muscongus Bay and common farther westward, quite often coming in to rocky areas on the coastal mainland; *transient*, fairly common coastwise; in *late summer*, uncommon but regular, most records being for Muscongus Bay and eastward.

Fall. Although adequate data are lacking, apparently most birds arrive in our waters from the latter half of October to late November (but see Late Summer).

Spring. The northward movement apparently begins in late March, and most birds withdraw from the state between April 1 and 26. Later dates are for a large flock seen on May 1, 1923, on Egg Rock in Jericho Bay, Hancock County (Norton), and 15 seen on May 9, 1945, at Corea, in the same county (Weston).

Winter. The flocks usually contain from ten to 40 birds, and occasionally more.

Late summer. Although a single bird was taken on July 14, 1936, on Londoners Island in the New Hampshire part of the Isles of Shoals, I find no Maine records between May 9 and July 23. The two July records are for unstated number seen on July 23, 1940, and July 25 to 28, 1938, on islands in Muscongus Bay (Cruickshank and J. Cadbury). The species occurs quite regularly in small numbers (up to ten seen together) from August 6 on, chiefly from Muscongus Bay eastward, but occasionally farther westward and in lesser numbers. A total of about 37 August records are at hand. In early September, there is a slight increase in numbers seen, and from then on, one may be fairly certain of finding a few birds at their favored haunts.

Ecology. This sandpiper is remarkably local in its habitat preference, being found regularly on some rocky point or ledge, and seldom or never visiting other nearby sites which appear to be similar in character. It is the most deliberate in manner of our sandpipers. It feeds close to the surf, frequently walking to the top of a rock to survey the surroundings, then again descending to the surf line. It faces the breakers, being ready to retreat from a rush of surf, and sometimes stands firm as a wave breaks and spray passes over it.

Remarks. There are no data at hand on changes in population, other than that Spinney noted that the species was unusually scarce at Seguin in the winter of 1905–06.

Norton (1909f: 440) stated that he had found the diet of this bird to consist commonly of small blue mussels (*Mytilus edulis*) and barnacles (*Balanus balanoides*).

On February 7, 1894, when hunting birds with Rackliff in Knox County waters, Norton (1895: 363) saw a pair of Ravens chase a Purple Sandpiper, following it like hawks, but the bird escaped by dodging behind a rock.

Pectoral Sandpiper

Erolia melanotos (Vieillot)

Transient, rare in spring mainly coastwise, and in fall, numerous to abundant coastwise and rather frequent but irregular inland.

Spring. Records for Scarborough are as follows: one, April 13, 1871 (Smith); one, April 16, 1907 (Pillsbury); several, April 30, 1864, seven on May 8, 1852, one on May 11 and 12, 1858, two on the 17th, and one on the 25th (Loring). Some of these records were cited by Smith (1882–83: 66). Kilburn (1922b: 116) stated that this species was a rare migrant in spring along the Aroostook River, Aroostook County.

Fall. The species generally is present by August 12, occasionally by August 6, and N. C. Brown (1882f: 26) and others have stated that migrants sometimes appear by very late July. Two were seen in the Muscongus Bay area on July 16, 1938 (J. Cadbury and others). Brewster (1925: 242) gave a July 21 occurrence for Lake Umbagog [? Me. or N. H. part]. A few occasionally linger until October 31, and later dates, for Scarborough or nearby Westbrook (unless stated otherwise), are as follows: five shot on November 2, 1875 (Rogers); four shot on November 4, 1867 (Smith); about 30 seen on November 8, 1879 (Smith); one shot on November 10, 1898, at Pittsfield, Somerset County (Morrell, 1898b); two seen on November 10, 1937 (R. H. Norton); and one shot on November 11, 1881 (Rogers).

Flight years. Unusual numbers were present at Scarborough in the fall of *1895* (Norton) and *1911* (Pillsbury); they were scarce there in the fall of 1905 (Brownson, 1905d).

Ecology. The Pectoral Sandpiper usually is found among fairly dense grasses and sedges in marshy places where the ground is very wet or there are puddles. They do not remain grouped when feeding, but scatter through the vegetation, and join in a compact flock on taking wing. Though few of these birds stop at inland points during

dry autumns, they sometimes are quite common during wet seasons when there are puddles in hayfields.

Remarks. This species apparently is never as numerous on the eastern part of the coast as farther westward.

For the years 1864 to 1892, Rogers shot 633 birds on the Scarborough marshes, his largest annual bag being 141 in 1867, and the smallest less than ten per year in 11 different years. From 1891 to 1912, Pillsbury shot 1,091 on the same marshes, his largest bag being 144 in 1891. During the decades of market gunning, this species was not greatly reduced in population by gunners.

White-rumped Sandpiper

Erolia fuscicollis (Vieillot)

Transient, rare in spring coastwise (records for York and Cumberland Counties), and in fall, common coastwise and occasional inland; one *summer* record.

Spring. Records at hand are: a male shot on April 27, 1912, at Scarborough (Norton, 1912b); one seen on May 19, 1947, at Ocean Park, Old Orchard Beach, York County (Webb *in* Gross, 1947f: 29); and unstated number seen on May 29, 1882, and May 30, 1881, at Scarborough (N. C. Brown, 1882f: 27).

Fall. "It appears in July on its southward journey, and may be found throughout October" (ibid.). Norton saw "many" on July 30, 1941, at Scarborough. Late dates are: three seen on November 12, 1945, at Petit Manan Point, Washington County (Weston); unstated number noted at "Portland" [=Scarborough] on November 18, 1906 (Norton *in* Brownson, 1907c: 37); and occurrence on November 29, 1911, at Scarborough (Pillsbury).

Flight year. In *1900*, a flight of thousands of these birds was observed by Pillsbury on October 14 at Scarborough.

Summer. A single bird was seen on June 28, 1939, at Hog Island in Muscongus Bay (Cruickshank).

Ecology. This bird is found on mudflats and barren shores, away from vegetation. It usually is in company with other small sandpipers or plovers.

Remarks. From 1891 to 1911, Pillsbury shot 358 of these birds at Scarborough. His yearly bag generally was small, although he shot 75 in 1893 and 49 in 1891 and in 1896.

Baird's Sandpiper

Erolia bairdii (Coues)

Transient, rather rare in fall, chiefly coastwise.

Fall. Most birds have been noted from August 26 to September 10. Early records are: for Scarborough in 1939, two or more seen on July 15 (Mrs. E. Dodge), three on the 17th (Norton), and three or more on the 18th (Mrs. Dodge); one seen on July 19, 1938, at Hog Island in Bremen, Lincoln County (Cruickshank); and an August 7 record for unstated year and locality (G. M. Allen, 1909: 74).

From 1874 to 1946, there are 16 occurrences from August 21 through September, totalling 21 birds of which at least ten were shot. Seven records are for Scarborough; three are for the Maine side of Lake Umbagog (Brewster, 1925: 246); and one each for Mt. Katahdin in Piscataquis County (W. Taber; see Remarks), Islesboro in Waldo County (R. Howe, 1900: 28), Eastern Egg Rock in Muscongus Bay, Greenland Cove in Bremen, Lincoln County, Pemaquid Point in Bristol, Lincoln County (all by Cruickshank), and Popham Beach in Sagadahoc County (Spinney). Brewster (1925: 247–249) also had six records, from 1894 to 1897, for the New Hampshire part of the Umbagog region, totalling 12 birds (six shot).

After a storm, a female was shot by N. Eddy, near Bangor, on November 1, 1881 (Knight, 1908b: 165).

Ecology. Norton's observations at Scarborough indicate that this sandpiper prefers open beaches or bare flats, where it probes for food; Brewster's observations at Umbagog are very similar. The bird moves leisurely and appears much less nervous than many of the other sandpipers. It usually has been seen alone, or in twos or threes, although Brewster once saw six or seven together.

Remarks. The tabulation of fall records above does not include several undated ones for Scarborough.

On the afternoon of August 23, 1946, near the summit of Hamlin Peak on Mt. Katahdin, W. Taber observed one of these birds feeding in an "alpine garden." The bird was approached closely several times, and it would take flight, uttering a "krupp" note each time it was flushed. It was observed for about 20 minutes.

Least Sandpiper

Erolia minutilla (Vieillot)

Transient, common in spring and abundant in fall on the coast and islands, and rather frequent about inland waters at both seasons; a few non-breeding birds remain on the coast all *summer*.

Spring. Most birds are seen from May 15 to 31. Early records are: several seen on May 10, 1938, at Brewer (Weston); about 25 seen on May 10, 1941, and a few seen on May 11 and 14, 1938, at Scarborough, and several seen on May 13 and 14, 1890, at Falmouth, Cumberland County (Norton); and eight seen on May 14, 1941, at Petit Manan Point, Washington County (Weston). Some transients linger as late as the middle of June.

Fall. Transients begin arriving by mid-July, but are most numerous from about July 25 to September 10, and a few linger until October 1 or later. Inland, Brewster (1925: 249) reported the species for as late as October 2 in the Umbagog region. In 1895, Norton saw one on October 9 and several on the 15th at Scarborough. G. M. Allen (1909: 74) listed October 15 for unstated place and year.

Summer. A few small flocks, usually of about five to eight birds, remain on the coast between migrations.

Ecology. Although this species often is seen on beaches and mudflats, as well as in fairly dense grass, it seems to prefer areas of stranded flotsam and open marsh growths near water. It prefers more vegetation than does the Semipalmated Sandpiper with which it associates most commonly.

Remarks. This species is less numerous than the Semipalmated Sandpiper. Usually these two 'peeps' are not separated in gunners' bag counts, but for the years 1864 to 1881 (except 1869, 1878, and 1879), 753 Least Sandpipers were listed in Rogers' journal as having been shot. His largest annual kill was 128 birds in 1867, all shot on August 26 at Scarborough.

In May of 1938 and 1941, at Scarborough, Norton noted that these unwary birds allowed him to approach within a few feet. Then they would run a short distance and squat down on stranded seaweed, where they were perfectly camouflaged.

Curlew Sandpiper

Erolia ferruginea (Pontoppidan)

One specimen was shot on September 15, 1881, at Pine Point, Scarborough (Wade, 1881b; Purdie, 1882).

Remarks. For the Calais region and mouth of the Bay of Fundy, Boardman (1862: 128) wrote: "Not very plenty." Undoubtedly this statement was based on the three specimens secured by him on the St. Croix River near St. Andrews, New Brunswick, as was reported by Baird, Brewer, and Ridgway (1884, 1: 247). Boardman probably secured another specimen later on, at Grand Manan, for Knight

(1897d: 47; 1908b: 167) stated that a specimen from there had been attributed to Maine, and Boardman (1903: 310) reported occurrence at St. Andrews and Grand Manan.

Red-backed Dunlin; Red-backed Sandpiper

Erolia alpina pacifica (Coues)

Transient, rare in spring and common in fall in Cumberland and York Counties, and at the latter season, rare farther eastward on the coast and a few inland occurrences in the Umbagog region.

Spring. All records, here given, are for May 15 to June 2 and in the Scarborough region, except one as noted: one seen on May 15, 1934 (Norton); one shot on May 21, 1897 (Pillsbury); one seen on May 22, 1941, at Drakes Island, Wells, York County (G. Dunthrone); two shot on May 26, 1896 (Pillsbury); and one shot on May 27, 1879, and in 1882, two shot on May 28, five on the 30th, one on the 31st, and one on June 2 (Smith, 1882–83: 66).

Fall. Transients are seen at Scarborough from September 21 to November 11, a small wave usually arriving in southwestern coastal areas about October 16 to 24. Two early occurrences for the state are for one seen on August 14, 1944, at Harrington, Washington County (Weston), and one seen on September 10, 1937, at Scarborough (Norton). Late records are: one seen on November 12, 1938, at Georgetown, Sagadahoc County (W. Taber); unstated number on November 17, 1906, at "Portland" [Scarborough] (*in* Brownson, 1907c: 37); one seen on November 18, 1868 (Smith), and one on November 23, 1930 (C. M. Mower), at Scarborough; two seen on November 29, 1947, at Wells Beach, York County (H. M. Parker); and three seen on December 1, 1913, at Scarborough (Pillsbury).

Flight year. "Those which come along the Atlantic coast in spring leave the shores of Massachusetts, and pass by Maine far from land over the ocean. Cold easterly storms prevailed on the coast of New England during their migration in May, *1882,* and dunlins, as also many other shore birds, were driven out of their usual course" (Smith, 1882–83: 66). Even though records for this particular season showed unusual numbers present, they indicated that not very many of these birds follow such a route in the spring migration.

Ecology. This sandpiper usually is found in places where it can wade in fairly extensive areas of very shallow and quiet water, such as pools left on mudflats by the receding tide, and pools in marshes, or on the edges of muddy banks in rivers, creeks, and estuaries. It is gregarious and social, the flocks mingling freely with other shorebirds.

Remarks. Judging from more frequent records in the past few decades, this bird appears to be increasing gradually in numbers.

Eastern Dowitcher

Limnodromus griseus griseus (Gmelin)

Transient, fairly common in spring coastwise east to Cape Elizabeth and in diminishing numbers to rare east of Penobscot Bay, and in fall, numerous west of Penobscot Bay, common farther eastward, and very rare inland; rare in *summer*, usually on coastal islands.

Spring. The Dowitcher generally arrives at Scarborough about May 20. Earlier records for that place are for one shot on May 15, 1868 (Rogers), and a report of them being "plentiful" on May 19, 1870 (Smith). There are May 22 dates for points east to Penobscot Bay. The flocks leave Scarborough by May 30 or 31. Some were seen there on June 1, 2, and 5, 1868, an exceptional year when the flight was later than usual (Smith).

Fall. Manasseh Smith (1874) stated that, at Scarborough, "the male birds are back here on their way south as early as July 4th, but usually not until the 15th. Females and young arrive the first of August." For recent years, there are five records for the period July 5 to 9, mainly for birds in nuptial plumage, and six records from July 11 to 18 for small flocks on islands. The first sizeable flocks usually are seen from July 28 to August 7, with many more arriving about August 13 to 18, and some occasionally remain until September 28. Later dates are: one shot on October 12 or 13, 1916, at Scarborough (Norton); one shot on October 22, 1879, at Vanceboro, Washington County (Smith); and occurrence on October 29, 1876, in the Portland region [probably Scarborough] (N. C. Brown, 1882f: 26).

Flight years. In spring, most Dowitchers pass a given point within a day or two, whereas in fall there seldom is a sizeable flight on any one day. The following data are for Pine Point at Scarborough. In *1864*, there was a fairly large flight on August 17 (Rogers). "May 25, *1868* was the largest flight I ever saw. They extended from horizon to horizon, and the flight lasted over three hours six miles out at sea (at right angles with their course). From where I was the same sight presented itself. The body of birds must have been 12 or 15 miles wide and at least 100 long. They did not 'darken the air,' but were in bunches from a dozen to several hundred, and were visible in all directions" (M. Smith, 1874). In *1872* there was a sizeable flight on August 12 (Rogers). In the spring of *1881* the flight was divided, there being unusual numbers on May 21 and a large flight on the 29th (N. C. Brown, Pillsbury).

Ecology. These birds move about slowly in very shallow water, following the edge of the tide, probing in soft mud or sand for worms and other invertebrates. Flocks often stand on rocks, stranded flotsam above high tide line, or dry ground having scant vegetation, thus passing the time when not feeding.

Remarks. In earlier times these birds were more abundant and were much sought after by gunners. Their compact flocks made profitable targets—"I have known eighteen of these birds [to be] picked up from one discharge of a gun, those which escaped alighting again but a short distance away, allowing the sportsman to repeat his depredations until every individual was killed" (Spinney, 1900c: 36). For the period 1842 to 1854, Loring shot 945 Dowitchers at Scarborough. Under legal protection, these birds have shown a gradual increase in numbers since the 1920's, but have not, as yet, equalled their former abundance.

Unquestionably, Boardman (1862: 128) was mistaken in stating that this bird arrives the first of April in the Calais region.

Long-billed Dowitcher

Limnodromus griscus scolopaceus (Say)

Two records for fall. One was shot October [14], 1912, at Scarborough (Norton, 1913: 576), and another there, September [19], 1913 (Norton, 1916: 381).

Remarks. A bird shot on September 7, 1862, at Scarborough, was recorded by Rogers in his shooting journal as "western variety, I think." N. C. Brown (1882f: 26) wrote: "I am confident that the western race *scolopaceus* visits us occasionally, although I have never met with it myself. Supposed examples of this form have twice been sent me for identification, in both instances, unfortunately, during my absence from town."

Stilt Sandpiper

Micropalama himantopus (Bonaparte)

Transient, uncommon in fall coastwise to Casco Bay, and two records for Muscongus Bay.

Fall. Most records are for July 30 to September 26. Early dates are: one seen on July 5, 1938, in the Muscongus Bay area (Cruickshank); one shot on July 19, 1875, at Chebeague Island in Casco Bay (T. M. Brewer, 1879b: 273); and two seen on July 28, 1937, in the Muscongus Bay area (Cruickshank, 1938: 551). Late records are:

one shot on October 2, 1908, at Pine Point, Scarborough (Brownson, 1908c: 119); and one seen on October 4, 1880 (N. C. Brown), and occurrence on October 6, 1879 (N. C. Brown, 1882f: 26).

Ecology. This bird wades in quiet pools, where it gets its food from and just below the surface of the water.

Remarks. From 1842 to 1854, Loring shot 11 Stilt Sandpipers at Scarborough. N. C. Brown shot ten there on July 30, 1879. During nine of the years from 1891 to 1908, Pillsbury shot a total of 29 at the same place, his largest annual bag being nine in 1902.

A report of "rare" in Washington County, by Boardman (*in* Knight, 1897d: 45) might possibly be based on New Brunswick occurrence. Spinney's report (1903a) for Metinic Island, Knox County, was subsequently withdrawn by him (1907).

Semipalmated Sandpiper

Ereunetes pusillus (Linnaeus)

Transient, in spring, common coastwise and occasional inland, and in fall, abundant coastwise and frequent inland; small numbers are seen regularly in *summer,* mostly on islands.

Spring. This sandpiper usually arrives by May 12, and many large flocks are present from May 15 to about the end of the first week in June. Early records are for a dead bird found on April 20, 1895, at Seguin (Spinney), and occurrence on May 6, 1879, in the Portland region [probably Scarborough] (N. C. Brown, 1882f: 27). Occasionally a few transients linger until shortly after mid-June.

Fall. There usually is an increase in numbers on the coast by July 18, and the species is abundant there from July 24 to September 25. Often there is a noticeable migration wave from about August 13 to 18. Late records for the Portland-Scarborough region are for two or three birds on October 12 in 1929 and 1939, six on October 14, 1932, one or more on October 16, 1927, and seven on October 19, 1933 (Norton). Inland, Brewster (1925: 252) noted the species as late as October 17 in the Umbagog region. A single bird was seen on November 10, 1937, at Bath, Sagadahoc County (D. French), and two were seen on November 14, 1941, at Drakes Island, Wells, York County (G. Dunthorne).

Flight years. In *1907,* thousands of 'peeps,' mostly of this species, were seen on July 28 near Belfast, Waldo County (Norton), and in *1912,* there was an unusually large flight in spring at Scarborough (Pillsbury).

Summer. The small flocks of non-breeding birds usually are seen on islands, and, rather rarely, on the coastal mainland.

Ecology. This gregarious and social bird shows a preference for mudflats, beaches, and the edges of marsh vegetation, choosing more open sites than does the Least Sandpiper with which it commonly associates. It wades more readily than does the latter.

Remarks. Brewster (1925: 252), whose visits to the Umbagog region covered the period from 1871 to 1909, found these birds abundant there in fall in the early 1870's. Then they "diminished steadily and unmistakably from year to year . . . and are now [by the time his visits ceased] slaughtered mercilessly by about everyone carrying a fowling piece."

According to Pillsbury, from about 1890 to 1910, boys in Cumberland County were paid a penny for two 'peeps,' and three for them dressed. The birds average about one ounce in weight before being plucked and cleaned. In the period from 1891 to 1911, Pillsbury shot 1933 sandpipers, mostly of this species, his largest bag being 467 in 1891. After 1900, when he shot only one, he never killed more than 77 a year. There are several known instances where over a hundred 'peeps' have been dropped by a single charge of shot from a large bore shotgun. The technique used was to scale a straw hat or similar object into the air, causing group after group of these birds to rise from their feeding grounds and join in a compact circling flock into which the gunner fired.

This species always has outnumbered greatly the Least Sandpiper.

While at sea off the coast, on September 5, 1913, Norton saw several groups of Semipalmated Sandpipers running about and feeding on drifting seaweed and flotsam.

Some display often is seen among late spring transients. Two birds face each other, with wings spread at a level with their backs, then hop into the air and drop to the ground, sometimes quickly repeating this action. Then they run about and feed. During and after these encounters, some individuals run about with tails raised and heads slightly lowered. Rarely, a pair of these birds will lock bills briefly, though more often a bird will retreat if another rushes toward it. On June 30, 1938, at Scarborough, Norton saw one bird attempt to mount another, but the latter did not squat or stay still; these were believed to have been summering birds. The sparring and locking of bills often are seen again during warm days in September.

In early August, 1934, a large flock of sandpipers, undoubtedly composed largely of this species, was first noted perching on flat gravel roofs opposite 500 Forest Avenue in Portland (Haven). They came to the roofs when mudflats were inundated at high tide. This habit of perching on roofs, in July and August, has become well established in Portland. The birds on Forest Avenue were observed by Norton

on several occasions. Haven (1948) has supplied some recent data on this habit.

Western Sandpiper

Ereunetes mauri Cabanis

One specimen and thirteen reports (May 26, June 8, and from July 19 to September 30). Weston shot one on August 9, 1945, at Brewer, and sent it to Mr. Ludlow Griscom, at the Museum of Comparative Zoölogy, who identified it. In 1933, on May 26, June 8, and July 19, Norton saw several birds at Scarborough, in company with Semipalmated Sandpipers, which he believed were of this species. The other reports, by various observers, are for one to three birds seen on the coast or islands from York to Washington County.

Remarks. Careful collecting will probably show that this bird is a regular fall transient. There is a record for Hampton, New Hampshire, for as late as October 10, 1899 (G. M. Allen, 1909: 77).

Buff-breasted Sandpiper

Tryngites subruficollis (Vieillot)

Transient, rare along the coast in fall, and doubtfully recorded for spring.

Fall. From 1845 to 1940, fifteen individuals have been shot and eight seen, in the period from August 1 to September 30. All records, here given, are for Scarborough unless stated otherwise: one shot on August 1, 1877 (Smith, 1882–83: 85); one seen on August 18, 1940, at Fore River, and at least six on the 20th, at Paysan Park, both in Portland (Norton); one shot on August 21, 1866 (Smith, ibid.); two shot on August 21, 1891 (Pillsbury); one shot on August 25, 1911, and one seen on August 29, 1939, the latter at Fore River (Norton); one bird shot on August 31, 1864, September 1 in 1877 and 1882, and September 3, 1864 (Smith, ibid.); a male shot on September 5, 1907 (Norton, 1908a); one shot on September 13, 1875 (Smith, op. cit.); and two each in the "fall" of 1845 and 1850 (Loring).

Ecology. Those seen at Fore River were very active, moving about much faster than their associates (Semipalmated Sandpipers); they apparently avoided water and the wetter parts of the mud (Norton).

Remarks. On Boardman's authority, Baird, Brewer, and Ridgway (1884, 1: 306) stated that this species was found near Calais in both spring and fall.

Marbled Godwit

Limosa fedoa (Linnaeus)

Transient, two spring occurrences at Scarborough, and rare in fall in Cumberland and Sagadahoc Counties, with one record each for Lincoln and Piscataquis Counties.

Spring. The two records for Scarborough are for a bird taken on April 20, 1865 (Smith, 1882–83: 85), and another in late May, 1884 (N. C. Brown, 1885).

Fall. The following records are for captures at Scarborough unless stated otherwise: three seen on August 6, 1947, at Western Egg Rock, Lincoln County, in Muscongus Bay (Cruickshank); a female on August 8, 1938, at Popham Beach, Sagadahoc County (Palmer); two on August 8 or 9, 1891 (N. C. Brown, 1900b); one on August 13, 1863 (Smith, 1882–83: 85); a female on August 16, 1904 (Brock, 1907); one seen on August 16, 1939, at Popham Beach (Cruickshank); one seen on August 20, 1947 (H. M. Parker); two on August 20, 1862, three on the 21st, and five on the 25th (Smith, op. cit.); two seen on August 29, 1934 (Nichols *in* Low, 1934: 368; Nichols and Nichols, 1935); one seen at close range on September 10, 1944, on the tableland on Mt. Katahdin (M. Linton); and one, about September 13, 1900, at Popham Beach (Swain, 1900c: 33; Spinney, 1902b: 44). Smith (op. cit.) listed four more shot at Scarborough, two in 1852 and one each in 1855 and 1857; these probably were shot in fall.

Ecology. Those birds for which data are available were noted mostly on open beaches, but also on mudflats and in pools in salt marshes.

Remarks. Most of those birds reported by Smith were shot by Loring, and the records as here given have been checked against Loring's shooting journal.

The August 16, 1904 record was attributed erroneously to J. Lord by Swain (1904g), the specimen having been taken by G. Cushman, as reported by Brock (1907).

Hudsonian Godwit

Limosa haemastica (Linnaeus)

Transient, occasional in fall in Sagadahoc, Cumberland, and York Counties. No records since 1940.

Fall. Records are for about 40 individuals seen or shot between August 9 and about October 30, from 1842 to 1940, and are mostly for Scarborough. The following are for other localities: "a few" on August 28, 1877, at North Yarmouth, Cumberland County (N. C. Brown); two seen on August 28, 1893, at Calf Island, Georgetown,

Sagadahoc County (Rackliff); one seen on August 16, 1921, at Little River, Georgetown, and one shot in Casco Bay and delivered to a taxidermist on October 30, 1925 (Norton); one seen on October 14, 1929, at Falmouth, Cumberland County (Rich); and one seen on September 3, 1940, at Wells, York County (D. Riedel).

Ecology. Transients are found in the same habitat as the Marbled Godwit. Usually single birds or pairs have been noted, with one record of three, one of four, and the one of "few" mentioned above.

Remarks. N. C. Brown (1882f: 28) stated that large flights of Eskimo Curlews and Golden Plover were "apt to bring this bird in unusual numbers." Boardman (1862: 129) reported that this bird occurred in fall and spring in the Calais region, but later (*in* Baird, Brewer, and Ridgway, 1884, 1: 262) stated it was "quite rare," without mention of seasons.

On the tableland of Mt. Katahdin, on September 12, 1933, A. E. Brower saw a bird which he believed to be of this species. I recall a report of occurrence in Penobscot Bay, but am unable to locate it at present. A report of one seen on May 22, 1948, "near Capisic Street, Portland" (Beach and others *in* Gross, 1948b: 70) would seem to me to be rather doubtful.

Ruff

Philomachus pugnax (Linnaeus)

Four records, one for spring and three for fall. All records are for solitary females shot and are as follows: April 10, 1870, at Scarborough (Smith, 1882–83: 85); September 8, 1874, at the mouth of the Cambridge River, Oxford County (Brewster, 1876a: 19); September 14, 1900, at Camden, Knox County (Thayer, 1905); and October 16, 1912, at Scarborough (Norton, 1913: 576).

Remarks. The Scarborough specimens are in the collection of the Portland Society of Natural History and the other two in the Museum of Comparative Zoölogy at Harvard.

Boardman's report (1862: 129) referred to New Brunswick and not Maine occurrences. This species was included in the early Maine lists of Holmes (1861a: 120) and Hitchcock (1862: 70), undoubtedly as a result of correspondence with Boardman.

Sanderling

Crocethia alba (Pallas)

Transient, rare in spring coastwise, and in fall, numerous to abundant in coastal areas and rare inland; one or two *winter* occurrences.

Spring. Records at hand are: May 5, 1906, at Saco, York County (Abbott *in* Brownson, 1907c: 37); five seen on May 19, 1941, at Scarborough, and two on May 23, 1938, at Wells Beach, York County (Norton); two shot on May 26, 1896, at Pine Point, Scarborough (Pillsbury); five shot on May 30, 1882, at Old Orchard Beach, York County (N. C. Brown, 1882f: 27) [stated as eight seen and five shot at Scarborough by Smith (1882–83: 85)]; and six seen on June 12, 1938, at Scarborough (Norton). The species was reported as rare in spring at Mt. Desert Island (Tyson and Bond, 1941: 60).

Fall. Transients arrive rarely by mid-July, occasionally by August 1, commonly by August 15, and are numerous or even abundant at a few localities from August 15 to October 20 or later. There are ten records at hand for the first 12 days of November, the largest numbers being about 275 birds seen on November 9, 1941 (W. Taber), and over a hundred on November 10, 1943 (G. Reeves), at Scarborough. Later records are: a flock of 12 to 20 birds seen on November 20, 1941 (G. Reeves), and a bird shot by Norton on November 24, 1894, both at Scarborough; three seen on November 29, 1947, at Wells Beach (H. Parker); and one seen on December 1, 1913 (Pillsbury), and two seen on December 9, 1945 (G. Reeves), at Scarborough.

Winter. A sandpiper, believed to have been of this species, was seen on December 31, 1913, at Lubec, Washington County (C. H. Clark, 1914: 249). A small flock was seen on February 21, 1926, at Falmouth Foreside, Cumberland County (Rich).

Ecology. Although the preferred habitat of this gregarious bird is open sandy beaches, it is seen occasionally on rocks and mud banks. The flocks spread out along the beaches, where they run close to the receding waves, picking up small invertebrates before the latter can bury themselves in the sand.

Remarks. Spinney (1901: 55) wrote: "It is only a few years since, that the beaches of our coast afforded during September, thousands of . . . [Sanderlings]. Flock after flock, each numbering hundreds, could be seen running along the beach at the edge of the surf, searching for food. So plenty were they, that I have known of fifty and even a hundred killed by a single discharge of a gun. Walk along the same beaches at the same time of year now, and there will be days and days that not a bird of this species will be seen, and if seen at all it will be in straggling flocks of from a dozen to twenty birds."

Josselyn, who lived at Scarborough, wrote (1674; 1865b: 80): "There are little Birds that frequent the Sea-shore in flocks called *Sanderlins*, they are about the bigness of a *Sparrow*, and in the fall of the leaf will be all fat; when I was first in the Countrie the *English* cut them into small pieces to put into their Puddings instead of suet, I have known twelve score and above kill'd at two shots."

This species probably was never "abundant" on our coast in "summer," as stated by Coues (1868: 293), unless he meant late summer, nor was it "well known to breed," as stated by J. A. Allen (1870: 638).

Family RECURVIROSTRIDAE

American Avocet

Recurvirostra americana (Gmelin)

One specimen was taken on November 5, 1878, at Cape Elizabeth, and secured for the collection of the Portland Society of Natural History (N. C. Brown, 1879: 108).

Remarks. Boardman's specimen, taken in the spring of 1862, at Point Lepreaux, New Brunswick, has been cited as taken in Maine.

Black-necked Stilt

Himantopus mexicanus (Müller)

One specimen, shot at Rockland, Knox County, was received by Mr. Charles K. Reed, in Massachusetts, in early May, 1889 (Webster, 1889: 78).

Remarks. Boardman had a specimen, taken in the spring of 1862 at St. Andrews, New Brunswick, which several times has been cited as a Maine one.

Family PHALAROPODIDAE

Red Phalarope

Phalaropus fulicarius (Linnaeus)

Transient, in spring, rare in outer inshore and probably common in offshore waters, and in fall, uncommon but regular in outer inshore and common to numerous in offshore waters, straggling inshore mainly at the latter season (when it is rare inland); probably a rare non-breeder in *summer.* Alleged to have bred in Washington County.

Spring. One was shot by Norton on May 1, 1923, off Great Head, Mt. Desert Island (Tyson and Bond, 1941: 60), which is the earliest definite record of occurrence at this season. The latest is for a female shot on May 17, 1892, at Peaks Island in Casco Bay (Brock, 1896b). There are also at hand two other dated and several undated occurrences for May.

Fall. Most records are for the last week of August and throughout September. In the latter month, unfavorable weather in offshore waters often results in a considerable number of birds appearing in

the outer waters of the larger bays, and, rarely, some even straggling ashore. The latest two records are for single birds shot, one on October 17, 1893, in Somerset County (Morrell *in* Knight, 1897d: 43; 1908b: 148), and the other in the period November 3 to 10, 1939, at Mt. Desert Rock (M. Sullivan).

Flight year. In *1937*, many of these birds came well into sheltered waters. Over 500 were seen in Muscongus Bay on August 3, and scattered flocks were seen there to the end of the month (Cruickshank, 1938: 551).

Summer. On June 12, 1947, Mendall and J. Dudley observed an adult female in nuptial plumage at Pennamaquan River, Pembroke, Washington County. The following two occurrences may represent non-breeding summer residents rather than early transients: one seen on July 13, 1938, in Muscongus Bay (Cruickshank), and a July 25 occurrence for unstated year and locality (G. M. Allen, 1909: 66). (See Remarks for alleged breeding.)

Ecology. This gregarious bird normally is marine when transient, only straggling ashore in bad weather. It has been noted associating with the Northern Phalarope on many occasions.

Remarks. Brewster (1925: 215–217) gave several records for September 15 to October 6 in the Umbagog region (mostly Oxford County) and Knight (1897d: 45; 1908b: 148) gave the otheri nland occurrences.

In a letter to S. F. Baird, dated January 4, 1865, and published in Dall (1915: 380), Boardman wrote: "I found the red Phalarope breeding in two places last season." That the species was a "summer resident" in Maine, on authority of Boardman, was stated first in print by T. M. Brewer (1875: 445). Specific localities were given later (*in* Baird, Brewer, and Ridgway, 1884, 1: 329) as follows: "Mr. Boardman is quite positive that a few of this species breed on the St. Croix River every season. On one occasion, in company with Mr. Kisder, near Princeton [Washington County], in the last of June, he came upon some young birds already hatched and running about, and one of them was killed with a fishing-pole. This was in the neighborhood of Grand Lake, about sixty miles north of Calais, Me." Knight (1897d: 43) stated: "Mr. Boardman writes: 'I have twice found it breeding here,' meaning near Calais." In his 1903 list, Boardman (1903: 311) gave the status as "Not common: few breed."

Recently I asked W. A. Squires, of the New Brunswick Museum, to check the Boardman specimens there. He reported two adults, one, which he thought probably a female in breeding plumage, having written on the base on which it is mounted, "breeds on the St. Croix River," and the other, in autumn plumage, having the word "August." It is my belief that Boardman's report of breeding may have been based on finding molting adults rather than unfledged young.

Wilson's Phalarope

Steganopus tricolor Vieillot

Four definite records and a probable one. Brewster (1925: 221) saw a female on May 20, 1881, at Lower Richardson Lake in northern Oxford County; three were seen (one shot) on June 9, 1881, at the Nonesuch River, Scarborough (Smith, 1882–83: 124); one was seen on August 24, 1941, at Maquoit Bay, Brunswick, Cumberland County (Palmer); and a "bird of the year" was shot in "September or October," 1906, at Sabattus Pond, Lewiston, Androscoggin County (Knight, 1908b:150) [given by C. E. Miller (1918: 70) as "October"].

The probable record is for four birds seen on August 28, 1873, at the mouth of the Cambridge River, Oxford County, by Brewster (op. cit.), who wrote: "I thought then, and believe still, that they were Wilson's Phalaropes, a species with which I was not then wholly unacquainted, having met with it living, on a previous occasion."

Remarks. Smith's Scarborough record (op. cit.), which has been misquoted more than once, is as follows: "I saw three phalaropes alight in the Nonesuch River, near 'Black Rock,' Scarboro, June 9, 1881. My companion, William H. Stephenson, Esq., shot one of these, and it proved to be of the species above named." Further information is found in Smith's shooting journal in which he wrote that the bird was hung up and found to be too decayed to preserve when next examined.

Allan Moses saw a single individual on the early date of March 6, 1909, in the Grand Manan archipelago (Legge, 1909a).

Northern Phalarope

Lobipes lobatus (Linnaeus)

Transient, in spring, abundant in offshore and inshore waters of the Maine-New Brunswick boundary, straggling inshore farther westward, and rare inland, and in fall, a similar status except that more stragglers come ashore to the westward and inland; reported in summer and winter.

Spring. Maynard Torrey saw about a dozen of these birds off the Duck Islands, Hancock County, on March 25, 1937 (Norton). Just beyond our border, Allan Moses (*in* Legge, 1909a) reported a thousand seen on April 6, 1909, near Grand Manan. In Maine, the earliest spring capture is for a bird shot on May 3, 1897, on the Sebec River near Milo, Piscataquis County, as reported by Knight (1897d: 44). The greater part of the transients are seen offshore and inshore near

West Quoddy Head, Washington County, from May 21 to June 11.

Fall. Flocks are seen regularly the third week in July in eastern Maine inshore waters, and from about July 28 off Casco Bay. By the last week in July, many thousands usually are present near West Quoddy Head, and throughout August, perhaps several hundred thousand occur in that vicinity. A great many also are found offshore, while little groups stray into the bays or ashore, usually when there is an easterly wind. By September 10, only small numbers remain, and September 22 appears to be about the normal limit of fall occurrence. Later dates are for a single bird shot on October 24, 1897, at Long Island, Sagadahoc County, in the mouth of the Kennebec River (Spinney), and one, which had been wounded at least several days earlier by a gunner, found on November 11, 1944, at Middle Bay, Brunswick, Cumberland County, by C. Packard and identified by Gross.

Ecology. This gregarious species is mainly a marine bird with us, but also occurs well inshore, or in sluggish streams, small ponds, and lakes. On inland waters, it had been noted well out from shore and also ashore, feeding among sandpipers.

"The explanation of this gathering [of thousands off Quoddy Head], which Mr. C. H. Clark, of Lubec, informed me was not unusual, is, that the birds find their feeding ground in the eddy formed by the meeting currents from Cobscook Bay, St. Croix River and Passamaquoddy Bay, between Deer Island, with its approaches, and Campobello Island" (Norton, 1907a).

Remarks. The number of inland records for fall, especially those of Brewster (1925: 219–220), may indicate an overland migration by small numbers of these birds.

H. Herrick (1873: 37) stated that thousands of these phalaropes were seen "all summer" on the water about eight miles from Grand Manan. As far as breeding is concerned, Audubon's statement (1835: 118) that some "remain and breed" as far south as Mt. Desert Island seems questionable. Verrill (1863: 234) stated that the species "possibly breeds" on islands at the mouth of the Bay of Fundy; this may have been based on Audubon. It is more than likely that these statements were based on the occurrence of transients in early June or from late July on.

As for winter records, Knight (1908b: 149) stated that in February, 1900, he saw "a dozen in the waters between Castine and Belfast," in upper Penobscot Bay. Forbush (1925: 376) listed December 16 and February 11 occurrences for Massachusetts.

Although Knight (op. cit.) wrote that occurrence was not rare along the coast "from September to November and in April and May,

occasionally also in late winter," I am unable to substantiate general occurrence as late in fall or as early in spring.

Family STERCORARIIDAE

Pomarine Jaeger

Stercorarius pomarinus (Temminck)

Transient, very common on offshore fishing grounds in spring and fall, and occasional in spring and uncommon in fall in waters within view from outer headlands and about inshore terneries; rare *non-breeding summer resident.*

Spring. Knight (1908b: 39) mentioned "May" occurrence, and Norton (1916: 376) gave May 29, 1914, as his earliest record for this season. Norton (*in* Knight, 1897d: 157) reported having seen three of these birds on June 23 and again on the 24th, 1895, in Lincoln County waters.

Fall. At this season, when the main flight passes well offshore, the numbers seen near shore and about terneries are at their maximum from about August 20 to September 20. Late dates are: a number seen on September 23, 1886, off Casco Bay (Newcomb, 1887: 152); one shot inland at Kenduskeag, Penobscot County, about October 23, 1883, and seen on the 30th in a Bangor taxidermist's shop (Hardy); "late October" at unstated locality (Knight, 1908b: 39); and a female shot on November 9, 1899, at Cod Ledge, off Casco Bay, and later purchased by Norton from a Portland taxidermist.

Summer. "On the Maine coast they occur throughout the summer" (Norton, 1916: 376).

Ecology. This pelagic air hunter feeds mostly on what it forces terns and gulls to disgorge, but also secures smaller birds, as well as other food directly from the water's surface. It does not seem markedly gregarious when in our waters, but what appears to be cooperative action occasionally is seen when two birds join in attacking a tern.

Remarks. In addition to the Kenduskeag specimen, cited above, another was taken inland on unstated date, near Waterville, Kennebec County, and recorded by Knight (1899a: 1).

Of the three jaegers, this is the only one found with any regularity in or near inshore waters. Here, after storms, increased numbers have been noted.

Adults in the dark phase of plumage are not rare.

Norton observed one of these birds harrying Wilson's Petrels on September 13, 1916, off Casco Bay. He shot the bird, and on exami-

nation, found a sparrow in its gizzard. Allan Moses watched a pair catch, and one of them eat, a phalarope, on May 26, 1911, in New Brunswick waters (Tuttle, 1911).

Parasitic Jaeger

Stercorarius parasiticus (Linnaeus)

Transient, very common well offshore in spring and fall, and rather rare to uncommon in late spring, uncommon in fall, and rare *nonbreeding summer resident* in waters within view from outer headlands and about inshore terneries; may occur in winter.

Spring. The earliest inshore date is for a specimen taken on May [23], 1901, off Port Clyde, Knox County, and in the Spinney collection (Swain, 1901d: 30). The latest record that might be called a spring one is for a bird seen by Rackliff on June 11, 1899, in Knox County waters.

Fall. Most inshore records are for the period from July 20 to August 20. On September 22, 1874, Smith received a bird from Scarborough (Smith, 1882–83: 204), and on September 23, 1886, several were seen off Casco Bay (Newcomb, 1887: 152). Forbush (1925: 57) stated that this species occurred to November 1 in Massachusetts, perhaps referring to Gulf of Maine waters. (Also see Winter.)

Summer. One was seen on June 17, 1947, in Muscongus Bay (Cruickshank). There are other inshore records from July 16 on. Knight (1908b: 41) stated that this species occurred in July, but gave no specific dates or records. It seems very probable that any birds seen in the latter half of June or most of July are summering nonbreeders rather than transients.

Winter. Audubon (1835: 503) stated that this bird occurred in winter in Maine. Boardman (1862: 131) wrote: "Winter or late in fall. Rather common." (See Remarks under the next species for comments on Boardman.) On authority of Rackliff, Knight (1908b: 40) listed this bird as a winter visitor in Knox County waters; this is based apparently on the one or more jaegers seen on December 30, 1898 near the Green Islands off western Penobscot Bay, but Rackliff did not identify the jaegers as this species to his complete satisfaction. Rare winter occurrence on the eastern Massachusetts coast was reported by Howe and Allen (1901: 31).

Ecology. This bird is similar to the preceding one.

Remarks. Statements that this species is "quite common" in spring, or of general occurrence in May and June, apply to outer offshore waters.

Adults in the dark phase of plumage are outnumbered about two to one by light-colored birds.

Long-tailed Jaeger

Stercorarius longicaudus Vieillot

Transient, very rare in fall in inner offshore waters and in unknown numbers well offshore. Occurrence at other seasons within our limits is not definitely established.

Records. I find only two acceptable Maine records, these being for one seen on July 31, 1941, some miles at sea off Lincoln County, by Cruickshank, and one shot on August 30, 1908, off Peaks Island in Casco Bay, and now in the Portland Society of Natural History.

Remarks. On November 30, 1897, Spinney saw six jaegers, off Seguin, which he believed to be of this species, but could not identify them beyond question.

Boardman wrote (1862: 131) of this species. "Fall and winter. Common in the Bay of Fundy in August." Later (1903: 315), he stated: "Common; fall." His first statement almost certainly was the basis of T. M. Brewer's report (1875: 449) of occurrence in winter on the Maine coast. It seems likely that Boardman's remarks on this, as well as the other jaegers, were based on information from fishermen who had seen these birds in numbers well offshore and not near inshore waters.

This species is the most pelagic of our jaegers. Rich's excellent account of jaeger habits, referring for the most part to the three species collectively (*in* Bent, 1921; W. Rich, 1929: 13–15) apply to waters a short distance beyond our limits.

The dark phase of this species is said to be very rare.

A specimen was taken just beyond our border, in inshore New Brunswick waters, on October 4, 1923 (Pettingill, 1939a: 341). Collins (1884: 326) had a jaeger specimen, not identified as to species, taken as late as November 30, 1878, on the offshore banks of Newfoundland. Forbush (1925: 59) listed the species as casual in winter in Massachusetts.

Great Skua

Catharacta skua skua Brünnich

No record of this species in inner offshore waters as defined for purposes of the present paper in fig. 2 (p. 10), but occurrence there is indicated by the following records for Massachusetts, north of Boston: one seen on September 17, 1878, in Ipswich Bay, by R. L. Newcomb (J. A. Allen, 1879: 128); seen on February 19, 1928, off

Rockport, by Griscom and others (Garrison, 1940: 568); and an immature bird, which had been banded as a nestling in the Shetland Islands the year before, found dead on February 4, 1940, by Miss L. Randell at Swampscott (ibid. 567–568).

The valuable notes on this bird by Rich (*in* Bent, 1921: 3–4, 5–6; W. Rich, 1929: 15–18) pertain to outer offshore waters beyond the scope of this paper.

Family LARIDAE

Eastern Glaucous Gull

Larus hyperboreus hyperboreus Gunnerus

Transient and winter resident, regularly uncommon coastwise (also has occurred at the Bangor Salmon Pool); one or more *summer* records.

Migrations and winter. This species usually appears about December 20. Early dates, for single birds seen, are for October 9, 1920, at Chebeague Island in Casco Bay, October 15 and 17, 1921, and October 16 and November 2, 1928, in Portland Harbor (Rich), and November 11, 1938, in Casco Bay (W. Taber). Usually single birds are reported seen in winter. Numbers increase after March 1, indicating the presence of transients, and most birds have departed by the 26th. Later records are for one shot on April 17, 1883, at Peaks Island in Casco Bay (N. C. Brown, 1883b), and one seen on May 7, 1920, in Portland Harbor (Rich).

Summer. Two records, which might be considered either as late spring or summer, are for one seen on May 24, 1917, at Scarborough (Norton), and another on May 31, 1947, at Popham Beach, Sagadahoc County (S. Higginbotham). Norton (1916: 377) reported shooting one on June 13, 1915, near Richmond Island off Cape Elizabeth.

Ecology. This bird apparently is quite similar to the Herring Gull, with which it associates, in habits and habitat preference, being seen mainly in sheltered waters.

Remarks. Although this species formerly was rather rare, there has been a marked increase in records since 1917. This is certainly due to more birds being present rather than to an increase in observers.

Eastern Iceland Gull

Larus leucopterus leucopterus Vieillot

Transient and winter resident, in variable numbers but generally uncommon coastwise (also occurs occasionally at the Bangor Salmon Pool), and one record for well inland; two *summer* records.

Migrations. This gull usually arrives from mid-November to mid-December. Early dates are for single birds seen on October 7, 1932, and October 9, 1935, in Portland Harbor (Rich), and November 6, 1945, at the Bangor Salmon Pool (Weston). Most have departed by April 7. Later records are for three seen (one shot) on May 3, 1918, in Casco Bay, and one seen on May 9, 1918, in Portland Harbor (Norton), and one shot on May 20, 1915, at Richmond Island off Cape Elizabeth (Norton, 1916: 377).

Flight year. In *1918*, these gulls were common in Portland Harbor from early January to late April (Norton).

Winter. Two or three Iceland Gulls usually can be seen in each of several harbors at this season, and at the Bangor Salmon Pool, Weston usually has seen one each season. An immature female was shot on January 12, 1898, near Perley's Mills, Denmark, Oxford County, and identified by Norton (Mead, 1898; Norton, 1898a).

Summer. One of these gulls was studied carefully at close range on June 20, 1938, and one on August 3, 1948, in Muscongus Bay, by Cruickshank and others.

Ecology. This species has been noted most often associating with Herring Gulls in sheltered waters, and has been seen feeding on refuse with them.

Remarks. This species, which is occurring with increasing frequency, outnumbers the Glaucous Gull in our waters, the ratio being about two to one.

The digestive tract of a male, shot on April 2, 1918, off Cape Elizabeth, contained parts of annelids (Norton).

Kumlien's Iceland Gull

Larus leucopterus kumlieni Brewster

Transient and winter resident, rare (occasionally uncommon at a few localities) coastwise, and one or two generally at the Bangor Salmon Pool.

Migrations and winter. Judging from data at hand, this species arrives later than the other 'white-winged' gulls. The earliest records are for one seen on January 5, 1918, in Portland Harbor (Norton, 1918b: 220), and one on January 6, 1943, at the Bangor Salmon Pool (Weston). Single birds usually are reported for winter. Most depart by March 13, later records being for April 27 of unstated year at Portland (*in* Bent, 1921: 76), and for May 24, 1917, when two were shot at Scarborough and one was seen at Cape Elizabeth (Norton).

Ecology. From scant data at hand, it appears that this gull is similar to the preceding one in ecological requirements.

Remarks. An increase in records since 1920 may indicate more careful work on the part of observers rather than an increase in birds. Although this species was accredited only hypothetically to Maine as late as 1908 (Knight, 1908b: 646–647), a number of earlier specimens have since come to light. The earliest of these is for a bird, formerly in the Hardy collection, taken in February, 1885, at the Cranberry Islands in Hancock County.

Great Black-backed Gull

Larus marinus Linnaeus

Resident, a common to numerous breeder on coastal islands, the adults being subject to dispersal movements, and the young leaving the state (but not traveling as far as young Herring Gulls); some *transients* occur in coastal waters, also *winter resident* birds from northeastward.

Migrations. There is a dispersal away from breeding places in late July and August, with migration in September and October, and the return flight occurring chiefly in February. Accurate information, based on banding, is not extensive as yet, but the data given by Gross (1945a: 249–250) indicate that, age for age, birds of this species travel shorter distances than do Herring Gulls.

Breeding. The nest site, away from trees or other high structures, is usually on an elevated part of an island where there is a good view of the surroundings. The nest, larger and deeper than that of the Herring Gull, is made of the same variety of available materials (seaweed, grass, sticks, assorted debris). Three eggs (occasionally two) make a clutch, and usually are laid on alternate days, incubation beginning before the clutch is completed. By deduction, the incubation period being reported as 26 to 28 days (probably the latter), it is found that most clutches are completed from April 26 to May 10. Both sexes share the duties of incubation and caring for the young. Apparently the fledging period has not been determined in North America, but in Europe, it is reported as seven to eight weeks. (Summarized from unpublished information supplied by A. M. Barnes, who studied this species at Kent Island, New Brunswick, and from Gross, 1945a.)

Ecology. This gull frequents rocky or grassy islands during the breeding season. At other times, it is found on the entire coast, including sandy shores, river mouths, harbors, and about islands. This is also the habitat of non-breeding birds in spring and summer. Unlike the Herring Gull, this bird does not occur as far out at sea, and it is extremely rare even a few miles inland (although in Nova Scotia, it

has nested on at least one fresh water lake). In winter, many of these gulls parasitize the rafts of eiders, scoters, and other ducks, snatching food brought up from the bottom, and even killing a bird occasionally.

History. In a detailed discussion of the early literature, Norton and Allen (1931: 590–591) showed that this gull probably nested on eastern Maine islands long ago, but by the 1870's, had been forced eastward to New Brunswick waters. Thereafter it was fairly common throughout the year but not breeding, and birds could be found along the coast of Maine from Saco Bay eastward. They were more plentiful, but widely scattered, chiefly outside of harbors during the winter. Gradually increasing in the numbers which lingered throughout the summer, these gulls tended to assemble in flocks of five to fifty on ledges and islands, ranging far and wide to feed.

There was an unconfirmed report of nesting at Little Spoon Island, east of Isle au Haut, about 1916, and another at Double Shot Island, off Machias, Washington County, for 1923 (ibid. 590). In the summer of 1928, at least three pairs were seen, that probably nested, in the Herring Gull colony at Duck Island, the northernmost of the Isles of Shoals and part of the town of Kittery, York County, and in 1930, photographs of adults and young were made there (Jackson and Allan, 1932). Although this was the first definite breeding record for Maine, as well as for the United States, the first published records were those of R. Eaton (1931), for Essex County, Massachusetts, and Norton and Allen (1931: 589). The latter authors listed ten islands, having a total of 13 nesting pairs, from the "region of Machias Bay to the western proximity of Pemaquid Point [Lincoln County], roughly a distance of about 140 miles." They suggested that the species also bred on Elm Island in Casco Bay, and that probably it had nested in Maine for a few years prior to 1931.

It is very evident that the wary Black-back, which at present appears to be somewhat more rigid in its ecological requirements than the Herring Gull, had to reach a threshold of numbers before extending its breeding range. Moreover, it is possible that, at first, they were stimulated by the quite similar displays and posturings of large numbers of breeding Herring Gulls. Although the Black-back starts nesting earlier, Gross (1945a: 244) has shown that, almost invariably, new colonies are started in Herring Gull colonies. In a remarkably short period, the larger species has extended its breeding range all the way from Washington County, Maine to Essex County in Massachusetts, and farther south and westerly.

Although not a total census, of the 98 Maine islands visited during 1944, which had nesting Black-backs, Gross (ibid. 245) found that 15 of them had more than 20 pairs, 13 had 11 to 20 pairs, 23 had six to

ten, and 47 had one to five. Of this last group, 289 adults and a "proportionate number" of nests were seen. On the 51 islands having six or more pairs, there were 1,104 pairs, or an average of approximately 43 adults per island. (Ten islands having exactly five pairs each were counted twice in Gross' tabulation.) The largest colony was at Eastern Egg Rock in Muscongus Bay, where 150 pairs nested (ibid. 246). According to Cruickshank, there were over 480 pairs in the "Muscongus Bay area" in the summer of 1946.

Remarks. Of several Black-backs killed on September 13, 1916, off Portland Harbor, one had eaten fish, the crop of another contained the leg of a bird, and a third had the remains of a warbler in its digestive tract; in the crop of one shot on December 28, 1919, in Jericho Bay, Hancock County, were remains of a sculpin (Cottidae), a large rock crab (*Cancer irroratus*), and a large starfish (*Asterias vulgaris*) (Norton). Gross (1945a: 250–254) pointed out that, farther north, the Black-back eats a great many seabird eggs, eider ducklings, and, as observed in New England and elsewhere, it kills apparently healthy adult waterfowl. These habits, which are more pronounced during the breeding season, may become a prime factor among those influencing the population trends in our seabirds in the future. Gross concluded (ibid. 254): "In cases where the Black-backed Gull is nesting on small islands crowded with nesting eiders and especially where the destruction of eggs and young, and also of adults, is known to be excessive, an immediate control of these gulls is amply justified."

Data from the Fish and Wildlife Service show that control began in 1948, when 453 eggs were sprayed in six colonies, with Metinic Green Island, Knox County (234 eggs) much the largest colony. The number of adults on the coast was estimated at 1,538.

In competition with the Herring Gull, the Black-back has the advantage of greater size and strength, of beginning to nest earlier, and of choosing sites which command a view of its lesser relatives. It eats the eggs of the former, kills their chicks and, on occasion, has been seen to strike an adult bird and rob it of food.

The Black-back is adapting itself to living near humans. As far back as 1924, a few began coming into Back Cove in Portland where they pirated food brought to the surface by wintering Goldeneyes (Norton). For several years a few have been seen at the head of tidewater at Bangor, usually in late winter after the ice has gone out (Weston). This species has bred in captivity, both in this country and abroad. It seems, therefore, that with its present habits and potential adaptability, it may become as great a factor in the economy of nature on the coast as the Herring Gull has been for some time.

American Herring Gull

Larus argentatus smithsonianus Coues

The adult population on the coast is chiefly *resident* (subject to dispersal movements), common to abundant, and inland, it is fairly common on some lakes and larger ponds (very common at Moosehead Lake) in summer and uncommon about open water at dams and rapids in winter; abundant in migrations, birds consisting mostly of migrant young from the state and *transients* from elsewhere; some young and adults from outside the state are *winter residents.*

Spring. Many small flocks are to be seen passing along the coast in the second and third week of February, at which time they are rather noisy at night. They arrive in the last week of the month "with great regularity" at the colony on Kent Island, New Brunswick (Gross, 1940: 131). Coastal migration is nearly over by the end of the month. Arrival at inland breeding places is governed by the date on which the ice goes out, usually from mid-April into May, depending on weather and locality.

Fall. At the close of the breeding season there is a dispersal movement which reaches its peak during the last half of August. Birds of all ages follow the coastlines away from colonies in any direction (some young over 500 airline miles in the case of the Kent Island birds studied by Gross) before going south. Young of the year fly farther south than older birds, many reaching the Gulf of Mexico and a few going even farther. Gross (ibid. 136) found that banded Kent Island birds, in their first winter, go a mean airline distance of 861 miles south, the distance decreasing with age, so that fourth year or older birds pass the winter from Maine to the Carolinas, the mean airline distance they travel being about 291 miles.

Breeding. Arriving flocks stay near a colony for upwards to two weeks before occupying it. Most birds are paired on arrival. Two weeks or longer are then spent in display and posturing, establishment or re-establishment of territory, nest-building, coition, and related activities. The rather bulky nests are built on the ground or in low conifers, or sometimes on a stump or ledge. If there is no nesting material (twigs, seaweed, grass, or debris) nearby, the birds are known to carry it from points a half mile or more away (Norton, 1923a: 13–14). Eggs (usually two or three) are laid on alternate days, laying normally occurring from about May 10 to June 10. Incubation, largely by the female, begins after the first egg is laid, and usually lasts 28 days. The young fly at the age of six weeks or a little more. A single brood is raised yearly, but quite often a second breeding cycle is begun, which is not carried to completion.

The observations of Sage (1881: 51), Mead (1897b: 7), Norton, and myself, show that eggs hatch as early at inland sites as on the coast. Since ice conditions prevent the birds from arriving at these places as early as coastal birds do at their sites, inland birds must condense the early phases of the breeding cycle into a shorter span of time.

Winter. Each colony appears to have its own center of winter distribution of first year birds (R. Eaton, 1934: 80), and perhaps this tends to be the case also with older birds. Gross had no recoveries of adults within a hundred miles of Kent Island in winter.

Ecology. The Herring Gull is a remarkably adaptable species, inhabiting almost all types of shore and island environments, as well as inland lakes, sizeable ponds, and rivers. They perch on rocks, buildings, dense matted branches of conifers, and on dead limbs of trees.

They are accomplished at soaring flight. "These convective motions of air over the sea are revealed by the soaring routines of herring gulls . . . The first suggestive feature of their movements lies in the fact that they are not seen far (100 miles or more) at sea until fall, when cold air from the continent flows out over the warmer sea. The probable reason for this correlation is that the birds are unable to maintain a proper balance between their food supply and the energy requirements for flight until the development of the strong thermals of the fall and winter months make moving about over the sea physically easy" (Woodcock, 1942: 226). Many gulls go some distance inland in early fall. Not only is this their season of dispersal, but perhaps soaring conditions then facilitate their travels over land. During storms, many go to fresh water a short distance inland.

Herring Gulls prefer fresh water for drinking and bathing. During the latter part of the breeding season, when molting has begun, there is a ring of feathers about the shores of many ponds near the coast. The Portland Water District was forced, for sanitary reasons, to string steel wires across the city reservoir at Munjoy Hill to keep the gulls away.

Norton has discussed the relation of gulls to sheep on islands several times. His best account (1918d: 467) is here quoted at length. "It was found that much of the soil of these islands is very sterile, composed largely of decomposed wood, many of the deposits being over 2½ feet deep, entirely destitute of mineral soil. By visiting several different islands where the Gulls were abundant, and others where none or very few were nesting, it was possible to make a comparison of the conditions prevailing at the two different locations. On the islands where there were few Gulls, the vegetation was poor, closely grazed, and struggling hard for existence; moreover, the sheep there were eating the coarser forms of vegetation, left untouched on the

islands where the Gulls were numerous. On those islands where the Gulls were numerous, the vegetation was invariably luxuriant. On each of the latter were areas nearly free from Gulls, yet the sheep showed no preference for those locations, but were found to feed in the midst of the colonies as much, or even more, than in the parts where the Gulls were nearly absent. On these islands the coarse flags, sedges, rushes, and grasses were not touched by the sheep."

I am not aware that this gull is an intermediate host for any parasite detrimental to fresh water fishes. On the other hand, the report of Aldous (1941) would indicate that trematodes gotten from suckers and perhaps other fishes may have caused mortality among young gulls at Moosehead Lake.

In 1947, no eggs hatched at the Hogback Island colony in Moosehead Lake, apparently because some mammalian predator broke up the colony for the season (Woodward, 1947).

Economics on the coast. The chief benefit of this species to man is as a scavenger, eating garbage and refuse thrown into the water, or at dumps, as well as sewage. In the past, lobstermen have shot gulls for bait when fish was unobtainable. The gulls are a serious nuisance in many places, however, and in many ways. They spatter buildings and vessels with their droppings. Although their varied diet consists principally of garbage, marine animals, and carrion, they will eat any bait which is not kept securely covered; they flock to piggeries, eating the food put out there, and eat fish spread on fields for fertilizer unless it is ploughed under immediately. When harbors are iced over during severe winters, and food is scarce, they venture into vacant lots and on to city streets, in search of scraps. In the very cold first week of February in 1934, they alighted on streets of coastal cities in Maine, and flocked to the Fanueil Hall market area in Boston, gobbling scraps thrown to them, and they also gathered about trawlers at sea, getting tangled in the rigging and even alighting on the shoulders of men engaged in cleaning fish.

In early August, 1938, I lost many mousetraps containing *Microtus* at Stage Island, Sagadahoc County. The gulls quartered back and forth over the island, locating trapped mice and carrying trap and all to the rocks along the shore where the mice were shaken out and eaten. Dead mammals are eaten regularly.

Mendall (1935b: 20–22) has recorded extensive predation on eggs and young of the Double-crested Cormorant. They also eat eggs of other seafowl, especially eiders and terns. A gull will watch an eider for a long time, to see where it goes to its well-concealed nest. I have seen them kill and eat young, well-feathered Common Terns. Of 830 digestive tracts studied by Mendall (1935b), there was a total of 53

birds in 29 tracts. These included adult Semipalmated and Spotted Sandpipers, young Common Terns, a young Black Guillemot, adult and young Song Sparrows, and an adult Black-throated Green Warbler. The hunting technique for securing small birds is to quarter back and forth, low over the ground, thus flushing the quarry.

Fish eaten are chiefly herring, pollock, and mackerel, as listed by Mendall. Gulls feeding in a pound frighten the crowded fish downward and thus many are smothered.

Crustacea include: young lobsters (*Homarus americanus*) in that stage of development when they are very near the surface of the water (ibid. 12, 16–18); crabs (*Cancer borealis*), and, in winter, (*Carcinides moenas*) (Norton); shrimps, (ibid. 12; P. L. Wright, 1937a: 13); and skeleton shrimps (*Thysanopoda norvegica*) and cockles (*Purpura lapillus*) (Norton, 1909f: 438).

Stomachs of six young gulls from Little Spoon Island, Knox County, contained almost no fish, but all had eaten ants; one stomach contained a click, a scarabeid, and a cerambycid beetle, and 384 ants (*Camponotus pennsylvanicus*) (Norton *in* Dutcher, 1904: 164). Gulls have eaten grasshoppers at the Matinicus Islands (ibid. 165). A great many go to Mosquito Island, St. George, Knox County, in August to eat grasshoppers (Frank Trevor). Mendall (1935b: 12) listed "insects" among food eaten. Gulls feeding on ploughed or mowed fields and golf courses presumably eat many insects, but this type of feeding is less of a habit in Maine than farther southward, or with the European races.

Many echinoderms, both star-fish and sea urchins, are eaten (ibid.). These star-fish are harmful to edible mussel (*Mytilus edulis*) beds, now of some commercial value (but gulls also eat some mussels at low tide); the sea urchins consume vegetation on rocky bottoms, thus damaging the most favorable lobster habitat. Shells of the beach snail (*Polinices heros*) have been found at nests, and have been reported "common" at gull roosts (Norton, 1909f: 438); this snail is destructive to the clam (*Mya arenaria*). The white-lipped snail (*Polygyra albolabris*), an abundant species on many islands, is also eaten (Palmer). Sea cucumbers (*Pentacta frondosa*) have been found disgorged near a nest, and a gull was seen to drop a frozen one on a beach (ibid.). Squids (*Loligo pealii*) are eaten (Norton *in* Dutcher, 1904: 165).

On March 24, 1931, many gulls were seen feeding on the flats at the water's edge near Portland, probably eating an annelid, *Nereis*, according to Norton.

Of various types of vegetation and fruit eaten by this gull, blueberries are their favorite. Damage to blueberry fields began at least as far back as 1920. In 1928, Dr. G. A. Sawyer, of Milbridge, Washing-

ton County, appealed to the Federal Government in an effort to collect $2,400 for damage done to his blueberry fields the preceding year. Mendall (1935b: 19) saw an estimated 500 gulls feeding on a five-acre field in Knox County. He wrote: "Not only do the gulls eat the berries, but they beat down the frail bushes with their heavy wings, thus shaking off many of the ripe berries as well as breaking the twigs containing unripe fruit. The reports of this type of destruction by these birds have been very numerous and while some of them are undoubtedly exaggerated, many of them have been investigated and found to be true." The greatest damage has been in Hancock and Washington Counties. Various schemes, such as use of frightening devices, or gathering the berries as early as possible, have been used to reduce the amount of damage.

Economics inland. Analyses of stomach contents of 50 birds from inland waters, by Mendall (1939), showed 76.9 per cent of the food to be fishes, as follows: White Perch (*Morone americana*), sunfishes (*Eupomotis gibbosus* and *Lepomis auritus*), Yellow Perch (*Perca flavescens*), minnows (Cyprinidae), Small-mouthed Bass (*Micropterus dolomieu*), Common Sucker (*Catostomus commersonnii*), trout or salmon (Salmonidae), and undetermined fish remains. Also eaten were some insects (chiefly Hymenoptera and Coleoptera), mollusks (Unionidae), warblers and sparrows, and vegetable food, including blueberries. Among disgorged food at Moosehead Lake were four birds and an entire Red Squirrel (*Sciurus hudsonicus*). Considering that the larger fish taken by gulls often are picked up diseased or dead, that game fish are a very small item in their diet, and that the birds are good scavengers, Mendall concluded that the gull was an asset rather than a liability.

History before 1900. This condensed account is based largely on that of Norton (1924: 35–39), as checked against his original notes.

It seems certain that, from antiquity, gulls were robbed of their eggs and young by the Indians. Father Rasles, in 1722, told that the Indians of his mission were accustomed, after planting and hoeing, to go to the coast where they spent some months hunting seafowl and other marine life. Tradition still survives about Casco Bay that, when Indians came from the interior, they would meet at Yarmouth and there hold a meeting to decide where camp should be established each season. They returned to the same place only about once in three years, which prevented exhaustion of the resources of any one area. There can be little doubt that these Indians gathered eggs and flightless young gulls, and later, their white successors continued the egging on a larger and more exhaustive scale.

The coastal farmers, as late as the 1880's, were accustomed to go

on picnic parties for seabird eggs, when the season was right and hands could be spared from other duties. Since the bigger eggs were in greater demand, the big gulls were the first to be driven from the smaller, as well as all inshore, breeding places. Parties of eggers carried a pail of fresh water with them in which to float eggs; those incubated enough to float were put back to hatch, and only the fresh ones, which sank, were saved for food.

The rise of the granite industry, especially at Deer Isle, Hancock County, had its influence on the gulls. When business was poor, as it frequently was for a season or two, men had time to go egging. In these years, the birds thereabouts would raise but few young; with an improvement in business, the birds would make some gain. Thus they alternately lost and gained numbers, probably losing ground on the whole, up until the period when the great destruction for millinery purposes actually threatened their extermination.

There are great gaps in the recorded history of the gull population. Rosier, writing of his visit with Weymouth in 1605, and Capt. John Smith, writing of 1614, mentioned Mews or Gulls, but without comment. Nearly two centuries then passed before further information was recorded. Gulls were breeding on the coast about 1810 or earlier, but their distribution was probably spotty. According to Thomas Spinney, of Georgetown, they bred on Pumpkin Knob, near Damariscove Island, Knox County, prior to that date. According to Job Rackliff, they also bred in early times at the Egg Rocks in Muscongus Bay, but the date is lost. They nested on Wooden Ball, in the Matinicus group, Knox County, in large numbers in 1810 or 1811, according to Mark Young. About ten years later, Thomas Spinney and his uncle, David Spinney, rowed a wherry from Georgetown to the Ball (over 45 miles) to gather gull's eggs. They were very successful, and sold part of their supply at 12 cents per dozen.

According to Mark Young, the gulls continued breeding at Wooden Ball until about 1851, when for reasons unknown they moved to Ragged Island (now known as Criehaven) in the Matinicus group. About 1865, the first eggs (two) were found on No Mans Land in the same group. A colony here increased and thrived, and the Ragged Island birds joined them, and all went well until 1895, when fishermen camped there and the gulls moved back to the Ball for a single season, then returned to No Mans Land.

Norton visited this region from June 25 to 26, 1896, and learned that, a few days earlier, three bushels of eggs had been gathered on No Mans Land. Here the colony continued to be relatively large until it came under the supervision of William Dutcher in 1900, when the population was estimated at 3,000 pairs. It had, within a few years, been joined by birds driven from other colonies.

Since recorded times, gulls had bred in the vicinity of Vinalhaven, in eastern Knox County waters, particularly at the Brimstones and Otter Island, with its three small satellites, Roberts Island and the two Hay Islands. H. A. Arey visited these places in August, 1891, and wrote Norton that he had found young gulls of all sizes present. Norton visited there on June 26 and 27, 1896, finding 600 to 700 pairs on treeless Otter Island, and perhaps 100 pairs on Roberts and the two Hay Islands (all treeless). On Big Brimstone, there were 200 pairs; this island was wooded, the trees having dense masses of lateral branches and dense flattened crowns, and in a small grove on the northeast end of the island, the gulls had occupied old nests of crows and ravens, as well as having built many more in the scattered trees all over the island. All gulls were very wild, seldom coming within gunshot range. In March, 1900, Arey wrote Norton that about all the gulls had "left inshore and gone to No Mans Land and Wooden Ball."

In the region of Jericho Bay, the gulls have nested from the earliest times. Although there were reports that they nested on the Ears and the southern shores of Isle au Haut, there are no data on fluctuations or changes of locations. In the vicinity of Burnt Cow (now Swan Island), Hancock County, gulls bred on the outer part of Black Island before the quarrying of granite began, so Norton was informed by Capt. Dawes of Bass Harbor, but after the establishment of the quarry, they moved to the Sisters. Gulls probably bred in numbers in the Mt. Desert and Frenchmans Bay area, but there is only the report of Brewer (*in* Baird, Brewer, and Ridgway, 1884, 2: 238) that they were breeding from Frenchmans Bay to Labrador. This was rather vague, and Norton believed that there were no birds in the Bay proper at the time Brewer wrote; probably they had been driven to Swan Island or the Duck Islands. Between this bay and Narragaugus Bay, there are but few islands, all small, for gulls to breed on, and any colony that may have existed must have been small and undoubtedly was broken up at an early time. In the Narragaugus-Jonesport region, Capt. O. B. Hall of Jonesport told Norton, Stevens and Driscoe Islands were former breeding places. Norton visited both islands in 1902 and estimated, from available evidence, that the birds had been gone for seven to ten years. Of colonies farther eastward, no definite history has been found, except Brewer's inconclusive statement, and Boardman's, the latter mentioned in the next paragraph.

Far inland, Caucomogomoc Lake in Piscataquis County was resorted to so long ago that Thoreau (1864: 206), under date of July 26, 1857, stated that the Indian name of this body of water means Big Gull Lake. He also (ibid. 207) mentioned gull eggs at "Millinocket

River" [=Lake]. G. A. Boardman (1903: 194), in a letter to S. F. Baird, January 4, 1865, stated that Herring Gulls "are abundant all summer [at the mouth of the Bay of Fundy] and also breed about the fresh water lakes" of the Maine-New Brunswick border. Samuels (1867: 541), finding the birds alighting in pines and hemlocks at Lake Umbagog, suspected that they bred in the region. Sage (1881: 51), who may have visited only a part of Moosehead Lake, saw two nests there in June, 1881. C. T. Richardson (1894) wrote: "It is quite common for sea gulls to light on dead trees around the Rangeley Lakes. One pair have nested on a dead tree, the top being broken off. I think it was used for several years." About 1880, J. C. Mead (1897b: 7) found two pairs breeding in the Richardson Lakes in the Rangeley chain, and, during the 1880's, Dr. W. C. Kendall found a small colony at B Pond, Oxford County (probably the same place referred to by Richardson above), and collected eggs which were presented to the Bowdoin College collection.

When milliners first became interested in seabird feathers on a large scale in 1886, terns were their chief object of interest in the northeast, and these delicate birds were nearly exterminated at many of their larger breeding places in a single season. Either from a change of fashion or scarcity of birds, a period of rest was given until about 1896 when the birds had increased at many of the smaller colonies. Now fashion demanded the breasts and wings of the gulls as well as of the terns. Dutcher (1901: 94–95) has shown that, through keen competition amongst agents of milliners, the price for a dozen pieces rose from $4 to $12. The business was so profitable that even taxidermists engaged in the destruction.

Between 1896 and 1900, the birds in the vicinity of Vinalhaven had been exterminated or driven away, the Jericho Bay colonies were sadly reduced, and many others had ceased to exist. The few exceptions were colonies where lighthouse keepers had extended and enforced protection. By 1900, there probably were less than 9,000 pairs on the entire coast. So great and widespread had been the destruction that the press took up the cause for protection in 1900.

History after 1900. Once proceedings had started, protection was given fairly quickly. The history of this protection, through the Thayer Fund and the law passed by the Maine Legislature in 1901, has been told fully in the *Auk* from 1901 on, and in *Bird-Lore* from 1905.

By 1911, the birds had occupied Metinic Green Island in the Matinicus group, and apparently had moved into Penobscot Bay that year. In 1914, none could be found in Frenchmans Bay or the Mt. Desert region, but they were on at least four islands in Penobscot Bay.

None were nesting in Muscongus Bay. In 1916, the great colony at No Mans Land was breaking up and the birds were spreading to other places. Two years later they were beginning to breed as far westward as White Bull Island in Casco Bay. The 1920 inspection showed that the movement westward had been general, and that many other colonies had increased markedly. Norton's personal notes on an inspection trip of 1921 showed that he found an estimated 16,500 pairs breeding on 25 islands from Casco Bay eastward. In his published report (Norton, 1921: 356), however, this figure was misstated as "*upwards* of 60,000 pairs," and the error was repeated by Forbush (1925: 75).

In 1928, Norton (1928b) wrote: "Herring Gulls, during nearly thirty years of protection, have increased to the extent of occupying for nesting-places nearly every suitable island along the Maine coast. This increase has reacted unhappily on the Terns which formerly occupied many of the islands now taken by the big Gulls, and a decrease in the number of Terns is very noticeable." A year later, he stated (1929) that the gulls were nesting along the state's entire coastline. In 1931, they were nesting in 77 colonies (Norton and Allen, 1931: 591), the population, according to Norton's notes, being an estimated 25,000 pairs.

The increase in the 20-year period from 1900 to 1921 was not as great as might have been expected, especially in view of the increase in the 10-year period from 1921 to 1931. The reason for the slow increase is not clear, but perhaps a contributing factor may have been the continuation of egg robbing.

The inland population seems not to have changed drastically over the years. At the Hogback and Birch Island colonies in Moosehead Lake, there were 50 to 100 breeding birds in 1921, and Mendall reported them "plentiful" in 1939. Of numerous other inland places, perhaps none has over ten pairs, and one to several is the general rule.

Remarks. In 1934, control measures began on the coast and in various Maine colonies the eggs were punctured. Beginning in 1940, the technique of spraying eggs was substituted. The birds continue to sit on the eggs (which do not hatch) until after the 'laying phase' of the reproductive cycle is past. According to the U. S. Fish and Wildlife Service, the number of eggs sterilized each year it was done was as follows: 33,132 in 1934; 42,392 in 1935; 34,329 in 1936; 53,638 in 1940; 75,000 in 1941; 71,199 in 1942; 70,199 in 1943; 60,231 in 1944; 58,649 in 1945; 23,831 in 1946; 28,944 in 1947; and 21,232 in 1948. This gives a total of 572,776.

Opinions differ as to the effectiveness of control measures up to the present in Maine, but a marked decline in the breeding population apparently has resulted from it.

Since 1919 in the Maritime Provinces, permits to kill gulls (also to take eggs, since 1945) have been issued to land owners where gulls are abundant, with about 95 per cent of the permits issued to residents on Grand Manan (R. W. Tufts). Although the number of birds and eggs taken has not been large, the practice may help to hold down Maine's winter population to some extent.

In the meantime, the Herring Gull continues to extend its breeding range, having nested in New Jersey in 1946 (McMullen, 1947). About 14,000 eggs were found in 1947 on Muskeget Island, Massachusetts, where the breeding Laughing Gulls are not faring well in competition with the larger species (Gross).

Ring-billed Gull

Larus delawarensis Ord

Transient, uncommon in spring and, varying in different years, uncommon to numerous in fall coastwise; *winter resident,* somewhat uncommon; rare *non-breeding summer resident.* One inland record for fall.

Spring. Transients and winter residents usually depart in late March and in April, a few rarely remaining as late as May 6. Knight (1908b: 51) wrote that the species was present in smaller numbers in March and April than in fall, and Norton rarely saw it in Casco Bay in spring. Boardman (*in* Baird, Brewer, and Ridgway, 1884, 2: 246) stated that this gull was "quite common" in spring at the mouth of the Bay of Fundy, and later (1903: 314) that it was common in migrations. A late occurrence is for one seen on May 27, 1915, at Outer Green Island, off Casco Bay (Norton), and on June 4, 1906, "hundreds" were seen at Old Orchard Beach, York County (Smith).

Fall. Although the species occurs regularly at this season, numbers vary from year to year. They arrive rarely in late August, usually in early September, and most are seen in late September and throughout October. Large numbers were present as early as September 12, 1913, in Casco Bay (Norton). Most birds have departed by early December.

Summer. In 1932, on July 18 and days following, several were seen at Duck Island, off Kittery, York County (Shelley, 1932a). Small flocks were noted from July 20 to 26, 1933, at Kittery Point and vicinity (Shelley, 1934). One was seen on July 30, 1938, in Muscongus Bay (Cruickshank).

Winter. John Lord, a Portland taxidermist, stated (*in* Knight, 1908b: 151) that he had received "over 200 in the flesh in the fall of 1899," and that this species remained until "late in the winter about

Portland Harbor." Judging from Swain's report (1900b), the "200" should have been "100." Knight (op. cit.) stated that a few may be seen through the winter. A small number was seen (one shot) in early January, 1931, in outer Casco Bay (Palmer). In the winter of 1935–36, they occurred in "fair numbers" at Bar Harbor on Mt. Desert Island (A. Stupka), and are now known to be present in that region and elsewhere on the coast every winter. At the Bangor Salmon Pool, these gulls have been seen by Weston several times, the largest number being seven on February 28, 1940. I think it is safe to conclude that there has been an increase in the number of wintering birds during the past 20 years.

Ecology. This gull is found in less sheltered waters than is the Herring Gull. When feeding, it swims or floats on the surface, picking up organisms or refuse, and plunges forward, with wings raised, for food below the surface in much the same manner as Bonaparte's Gull.

Remarks. Inland, I saw two of these gulls on September 6, 1948, on Chamberlain Lake, in Township 7, Range 12. At Jackman, Somerset County, a few gulls have been seen from August 16 into September that were tentatively identified as Ring-bills by A. R. Phillips and A. J. Foerster. The species probably occurs inland every fall in small numbers.

Audubon (1835: 99) reported that this bird bred on several islands between Boston and Eastport, and at another island a few miles from the latter place. Boardman (*in* Baird, Brewer, and Ridgway, 1884, 2: 246) was of the opinion that none bred in his time, "whatever may have been the case when Audubon visited Eastport."

Western Black-headed Gull

Larus ridibundus ridibundus Linnaeus

One sight record. On November 29, 1947, one was seen at Prout's Neck, Scarborough, by H. M. Parker, W. H. Drury, Jr., W. Taber, and others who had observed the species at close range on a number of occasions at Newburyport, Massachusetts, and so were familiar with it (Taber, 1948a).

Laughing Gull

Larus atricilla Linnaeus

Transient, uncommon in spring and fairly common in fall coastwise; *non-breeding summer resident,* a few individuals being seen regularly east to Penobscot Bay, and rarely farther eastward. Former breeder, having ceased before 1944.

Spring. This species usually arrives from May 7 to 12. Although Knight (1908b: 52) reported arrival in late April, the only record I find for that month is for two seen by C. Packard on April 28, 1945, at Brunswick, Cumberland County. The next earliest date is for a bird which I shot on May 4, 1937, at Stillwater, Penobscot County.

Fall. Formerly, after the young were capable of flight, adults and young scattered along the western coast, then departed in September. At present, migration takes place mainly in this month. One was seen on October 2, 1909, in Casco Bay (Norton), and another "about the middle of November," 1923, at Bath, Sagadahoc County (Spinney).

Summer. Probably not over 35 non-breeding birds spend part or all of this season on our coast. (See History and Remarks for former breeding.)

Ecology. In migrations and summer, these birds are found in river mouths, small bays, inlets, and sheltered harbors. (Also see Remarks.)

History. Casco Bay colonies—This species bred "on several of the barren, outer islands of Casco Bay" (N. C. Brown, 1882f: 34). The last occupied one, "which it would seem was irregularly resorted to for . . . breeding," was Green Island (Norton, 1897d: 11). It was abandoned in the early 1880's, probably because of disturbance by man (Norton).

Muscongus Bay colonies—Marsh Island, east of Bristol, is a grassy island about 2½ miles north of Western Egg Rock. In 1937, about 40 nests were found, but most of the eggs were broken and the contents eaten by rats, and the birds made no attempt to nest there in years following (Gross, 1945b: 55).

Ross Island, east of Bristol, is a mile south of Marsh Island. According to a letter from Cruickshank, about 1940 an unstated number of Laughing Gulls built nests, laid eggs, and hatched some young, but the colony was wiped out that season by some animal (probably rats), and no other attempt to nest there was made.

Eastern and Western Egg Rocks and Shark Island are southeast of Marsh Island. From time unknown, these gulls "occupied the Shark, the Eastern and the Western Egg Rocks, at times scattering to all, at other times resorting to one or two of the three stations" (Norton, 1924: 66–67). They nested on Eastern Egg prior to 1895, but the introduction of sheep caused them to move to Western Egg, where, between June 21 and 26 of that year, 14 adults and two nests with eggs were seen (Norton, 1897d: 12). On August 1, 1897, an unstated number of adults was seen at Western Egg (Rackliff). In 1900, the Western colony was the only known breeding place in Maine, with four nesting pairs and about 30 non-breeding adults (Norton), and on July 5, 1901, two nests and 21 adults were seen there (Spinney,

1902a: 26, 27). The following year the birds moved to Metinic Green Island, but returned to Western Egg in 1904. In 1905, a small flock of adults was seen at both rocks in June (Norton *in* Dutcher, 1905b: 327), and at Western on August 17, 1907, there were about 50 adults, at least two flying and one partly fledged young, and an addled egg in each of two nests (Brownson, 1907d: 59; Norton, 1907d: 322). In 1914, for reasons unknown, these gulls left the Western rock and went to the Eastern, where they probably had not nested since 1895. On August 26, no less than a dozen flying young were seen there by Norton (1914: 492). In 1918, they moved back to Western Egg, and numbered between 200 and 300 adults (Norton). About 1920 to 1923, Herring Gulls began to encroach on these sites, and the Laughing Gulls were forced to leave, the last year of their breeding there being unknown.

Metinic Green Island, in the Metinic group, off Thomaston—This island was said to have been "an early breeding place for this Gull, but none of the birds were there in 1883, nor had been present for some years previously" (Norton, 1924: 66). In June, 1896, a "few" birds appeared and one egg (not in a nest) was found (ibid.), and in 1902, two nests were found and 32 adults seen (Norton *in* Dutcher, 1903: 127). This was the only known colony for that year. The following summer, there were eight adults and three nests (Norton *in* Dutcher, 1904: 149). The gulls came to the island in the spring of 1904, but, apparently because sheep were present, they went to Western Egg Rock to nest (Norton *in* Dutcher, 1905a: 91).

Little Green Island, off western Penobscot Bay—Only the smaller of the two Green Islands is known to have been occupied by Laughing Gulls. In the late 1860's and early 1870's, it was "hunted over for eggs several times every summer," and about 25 nests were "to be expected as a reward for a long search through dense herbage" (Norton, 1924: 66). During the 1870's, a fisherman built a cottage on the island, and, even after he and his family left in the early 1880's, the number of nesting Laughing Gulls continued to decline. On June 15, 1884, a "diligent search" revealed but one egg (Achorn, 1884: 85), the last found there in that century. How long this island had been reoccupied prior to 1931 is not known, but it seems likely that those gulls driven from Western Egg Rock in the 1920's established themselves here. On July 15, 1931, Norton and R. P. Allen found about 300 adults, a number of eggs, and a brood of three young (Norton). This was then the only Maine colony (Norton and Allen, 1931: 591). About 300 adults were present on July 9, 1936 (Norton; Gross, 1945b: 55), and about 250 pairs nested there in 1937 and 1938 (Cruickshank). Data for subsequent years are from Gross (1945b: 55–56). The 1938 population was maintained until 1940, when the population increased to

300 pairs. That year ten sheep were placed on the island, and more added the following year. They consumed the rank vegetation, where the gulls nested, to the extent that, in 1941, only 50 pairs nested. On June 15, 1944, Gross found that the turf on the island had been grazed closely, and not a single Laughing Gull was present.

Seal Island, off Vinalhaven, in the Matinicus group—Norton (1924: 65) quoted H. A. Arey that, in times past, some of these gulls nested on this island. Though it is not clear in the published statement, Arey wrote Norton that two or three pairs laid eggs in 1894, but the fishermen shot the adult birds.

Remarks. From the foregoing, it can be seen that the factors which caused this harmless bird to cease breeding in Maine were: human molestation and shooting, rats eating eggs and young, removal of vegetation from breeding sites by sheep, and loss of sites to the Herring Gull.

Since this gull may breed again in Maine, the following summary of breeding data is given. Sites were in areas of rank vegetation, usually on islands well away from the mainland. Nests were generally located near a stone, log, or hummock, which served as a perch. They consisted of a heap of weed stalks, sticks, grass, and debris, sometimes being lined with finer materials, and usually were under some protecting vegetation. There were well-beaten paths in the rank vegetation, the latter often being waist-high or higher. Fairly fresh eggs were taken from June 19 into July, but dates when young were found indicated that clutches usually were completed by June 20. The few records at hand are for three, and one set of four, eggs. Outside the state, incubation has been reported as 20 days. The fledging period apparently is unrecorded. One brood is raised yearly.

Food items in the stomachs of 39 Laughing Gulls, taken August 4 to 11, 1933, at Little Green Island and shoreward from there, were (in diminishing order of frequency): mollusks, fish, shrimps, insects, echinoderms, small crustaceans, and two young lobsters (Mendall, 1935b: 11). Since many young lobsters were available (ibid. 15), it is obvious that this animal is not eaten selectively.

Boardman (1862: 131) reported that a few of these gulls bred about the islands at the mouth of the Bay of Fundy. A later statement, on his authority (*in* Baird, Brewer, and Ridgway, 1884, 2: 255), mentioned colonies no nearer than the western extremity of Penobscot Bay, the species extending "its migration" only as far as the Bay of Fundy. Perhaps the earlier report had been based on hearsay. In 1940, Snyder (1940) reported the species nesting in Nova Scotia, where it may have nested over 80 years earlier.

Josselyn (1674; 1865b: 80) mentioned "Puets" as occurring in

Maine. Since, in England, this was a name for the Black-headed Gull, which is quite like our Laughing Gull in appearance, he may have seen the latter.

Gross stated in a letter that inclusion of "Pond Island" in his list of breeding places of this species (Gross, 1945b: 55) was an error.

[Since the above was written, I have learned from Oscar Hawksley that two pairs of Laughing Gulls nested on Machias Seal Island (Canadian territory) in 1948.]

Bonaparte's Gull

Larus philadelphia (Ord)

Transient, common in spring and common to numerous in fall coastwise, and uncommon inland at the latter season; *non-breeding summer resident,* occasional to uncommon coastwise; probably occasional in *winter,* but only one record at hand.

Spring. This small gull usually arrives about May 20, and is common from a few days thereafter until about June 14. Early dates are for one seen on May 7, 1890, in Casco Bay, and another on May 14, 1938, at Scarborough (Norton), and "large numbers" seen on May 17, 1911, at Scarborough (Pillsbury). It is likely that the species occurs quite regularly by the first of May, but has been overlooked by observers.

Fall. Some transients usually arrive by August 4, and the species is common coastwise from mid-August to November 1, with largest numbers in September. Since 1868 there have been scattered records for as late as November 20, with these later ones, by Spinney, for the mouth of the Kennebec River, Sagadahoc County: "abundant" on December 11, 1899; "plentiful" on December 13, 1901; and a number seen on December 17, 1898.

Summer. Small flocks are seen almost every year through June and July in sheltered coastal waters. Adults in nuptial and eclipse plumages and year-old birds have been seen, the latter in greater numbers.

Winter. Spinney (1899b: 18) and Knight (1908b: 53) both reported winter occurrence. The only specific information at hand later than the December 17 record under Fall, is for 33 birds seen on February 22, 1941, at Bath, Sagadahoc County, by W. Taber.

Ecology. This gull usually is found on calm, shallow, inshore waters and river mouths along the coast, and on lakes and ponds inland. They drift on the surface of the water, picking up small organisms, or plunge their heads below the surface. Very rarely, they dive from aloft in the manner of terns. The species is gregarious at all seasons when in our waters, flocks of up to 150 individuals being seen during migrations.

Remarks. Several early authors stated, without any known evidence other than summer occurrence of the species, that it nested in Maine. The last to make such a statement was Hardy (1896b: 114).

This gull, "besides its diet of fish, and garbage, has been found feeding over rafts of drifting sea weeds, when its diet was found to consist of maggots, probably *Coleopa* [=*Caelopa*] *frigida*, a fly that breeds at high water mark in decaying seaweeds (*Algae* and *Zostera*)" (Norton, 1909f: 438–439).

The most advantageous place and time to observe numerous Bonaparte's Gulls is in eastern Washington County waters in late August and throughout September.

Little Gull

Larus minutus Pallas

Two specimens and one sight record (for four birds) in fall. An adult male was shot on August 12, 1904, near Mosquito Island, St. George, Knox County (Norton, 1916: 377), and another adult male on July 20, 1910, at Scarborough (Norton, 1910b: 447–448). Four of these gulls were seen for several days in September, 1922, in Sagadahoc Bay (Spinney).

Remarks. Norton found that the 1904 male had been feeding on insect larvae, probably of the beach fly (*Caelopa frigida*).

Ivory Gull

Pagophila eburnea (Phipps)

Three records. One specimen, in the U. S. National Museum, was taken in December, 1894, in Penobscot Bay (W. Cooke, 1915b: 18). One was seen by Rich and Norton from January 4 to 7, 1918, in Portland Harbor (Norton, 1918b). One was shot on February 10, 1940, at Southwest Harbor on Mt. Desert Island (Sullivan, 1940a).

Atlantic Kittiwake

Rissa tridactyla tridactyla (Linnaeus)

Winter resident, usually common (occasionally numerous) in outer inshore waters and beyond; *transient,* fairly common in the same waters in early winter and early spring; rare in *summer,* having been reported chiefly in inshore waters; three inland records.

Migrations and winter. The Kittiwake arrives during the first three weeks in November, and numbers increase until mid-December. Numbers seen inshore in winter apparently depend on the weather in outer offshore and pelagic waters. At this season, the birds tend to spread out over a considerable area, rather than gathering in compact flocks. Birds begin to withdraw in early March, the last of them usually having gone by April 12.

Summer. There are no May records. Knight (1908b: 43) reported the species as "occasionally recorded" in June and August. I find 11 records (some unpublished) for July 10 to September 11, from 1903 to 1946. In each instance, one to six birds were seen, often in company with Bonaparte's Gulls.

Ecology. This semi-pelagic gull seldom enters small harbors, although it quite often goes up sounds and well into the larger bays. It does not concentrate about the outer islands, as often has been stated.

Remarks. Inland records are: one shot in 1884 at Kezar Pond in Oxford County (Nash *in* Knight, ibid.); one in October, 1890, at Lovewell's Pond, Fryeburg, Oxford County (Nash *in* Knight, 1897d: 18); and one shot about August 4, 1901, near Piper Pond, Abbot, Piscataquis County (Ritchie *in* Knight, 1908b: 43).

Caudemandies, a local name for Kittiwakes in Britain, were listed by Josselyn (1674; 1865b: 80) among the gulls seen by him in Maine.

Early statements to the effect that this gull bred on Maine and New Brunswick islands are erroneous.

Northern Sabine's Gull

Xema sabini sabini (Sabine)

Five records, all being for Cumberland County, and only one of them for spring, are as follows: a female in nuptial plumage shot on May 31, 1877, at Scarborough (Smith, 1882–83: 205); one seen on September 11, 1912, at Bluff Island in Casco Bay (Norton, 1913: 574); an immature bird shot on September 22, 1899, at the Brothers Islands, Falmouth (Knight, 1900a), and in the Brewster collection at the Museum of Comparative Zoölogy; and one seen on September 24, 1940, at Scarborough, and another on October 5, 1916, at Falmouth (Norton).

Remarks. One of the birds seen by Norton was feeding, in a very animated manner, along the water's edge.

A specimen taken in May, 1878, by Boardman in New Brunswick, has been accredited to Maine several times.

Eastern Gull-billed Tern

Gelochelidon nilotica nilotica (Wilson)

Three records, two being for spring and the other for fall in Cumberland County, are as follows: a specimen, taken in March, 1885, near Portland, and purchased for the collection of the Boston Society of Natural History from Ward's Natural Science Establishment in Rochester, New York (G. M. Allen, 1908a: 234); an adult shot by Everett Smith on May 21, 1881, at the Scarborough marshes (Smith, 1882–83: 205); and three birds shot, from a flock of several dozen, by Smith in September, 1868, at the same locality (ibid.), the exact date being the 13th, according to his shooting journal.

Remarks. Boardman (1903: 182–183) reported securing a specimen and, in the same volume (p. 314) listed the species as "Accidental in bay." It is not clear, however, whether the specimen was from Maine or New Brunswick waters.

Forster's Tern

Sterna forsteri Nuttall

Three sight records, all for immature birds, are as follows: one seen on August 16, 1937, in Muscongus Bay (Cruickshank, 1938: 551); one seen in the Bay on August 26, 1941, and two on September 2, 1946, at Pemaquid Point, Lincoln County (Cruickshank).

Northern Common Tern

Sterna hirundo hirundo Linnaeus

Summer resident, common to abundant on marine islands (less than 30 colonies) from York to eastern Washington County, and from one to several pairs nesting at a few inland lakes in Franklin, Somerset, Piscataquis, Aroostook, and Washington Counties; *transient* in spring and fall in unknown numbers (? common) on marine waters, and perhaps occasional inland.

Spring. Most of these birds arrive from May 14 to 27 at points all along the coast. Early dates are: May 7, 1906, at Saco, York County (Abbott *in* Brownson, 1907c: 36); May 9, 1884, in Muscle Ridge Channel, Knox County (Norton); May 11, in 1909 at Old Orchard Beach, York County (Smith), in 1938 at Popham Beach, Sagadahoc County (Osgood *in* Palmer, 1941b: 39), and in 1940 at Scarborough (Norton); and May 13, 1913, at Scarborough (Norton). Several to

many were seen on each of these dates, except the first for which details are lacking. Flocks have been seen flying along the coast and inland during the first part of June, and birds continue to arrive at colonies into the second week in the month.

Fall. Birds begin leaving the terneries during the second week in August, but may stay in the general vicinity for a few days thereafter before leaving the area. There is some evidence of a premigration dispersal movement, some birds following the coast in any direction, or even going inland, but such a movement is much less characteristic of this species than of the Herring Gull. Migration occurs mostly from about August 18 to September 8, but sometimes sizeable flocks have been noted up to two weeks later. Fifteen hundred seen by Norton on September 22, 1907, at Scarborough, is very late for so many birds.

The latest inland occurrence is for a bird seen on October 11, 1889, at the north arm of Lake Umbagog in Oxford County, by Brewster (1924: 62). Common Terns were seen by Norton at Scarborough, or reported to him from there, on the following late dates: one on October 2, 1906; several pairs on October 2, 1940; six adults on October 12, 1939; and, in 1909, between 20 and 40 birds on October 21, about the same number on the 26th, and two (one slightly injured) on November 14.

Breeding. Although this tern is a colonial breeder, single pairs have been found nesting on little islets in inland waters.

The birds may arrive at the ternery in a flock, or in scattered numbers over a period of weeks. Occupation of the ternery usually requires several days, the birds at first flying over it in the morning and evening, and later alighting there for a brief time only. At the time they begin alighting, they engage in a fish flight wherein a fish is exchanged from one flying bird to another, and, regardless of sex, the fish carrier flies with head bent downward and the other with bill pointing forward. After a male has a territory, he flies only in the 'bent' position, and tries to lead any bird that flies with him to his territory. After alighting, the owner pecks the partner ('sex recognition'), and if the latter is also a male, he is intimidated and leaves, whereas a female may submit to this several times and remain. After a period of such testing, a male and female (often mates of a former year or years) fly together and a fish is passed from one to the other when they are flying.

Incipient nest building begins when birds first alight in a ternery, this consisting of the digging of little depressions. Later, both sexes pick up such objects as twigs or straws, carry them about for a while, then drop them anywhere. A number of shallow cavities often are dug. The one in which eggs are laid is, preferably, not far from some

upright, low vegetation in an open spot on sand, pebbles, turf, grass, or even bare rock. Some nesting material may be added before laying begins, or there may be none; usually most material is added during incubation. Nests are made of straws, twigs, feathers, pieces of shells, pebbles, and any debris that the female can gather in the immediate vicinity.

Clutches, sometimes started by May 27 though generally from June 1 to 5, usually consist of three eggs, but quite often two, and less often four, eggs are found. Laying usually takes place on alternate days, and incubation begins with the first egg. Near Popham Beach, I found that incubation was usually between 23 and 26 days, both sexes taking part but the female more than the male. The young remain in or close to the nest for about five days, showing a tendency, when alarmed, to crouch in contact with each other. Thereafter, they crouch separately, and, showing no great attachment for the nest or nest site, many get killed when they wander into other nesting territories. Feeding is, at first, done wholly by the female with food brought to her by the male, and later both sexes take part in this activity. The young fly at an average age of 30 days, and are fed by the adults for some time thereafter. One brood is raised yearly.

Most birds do not breed until their third year, and, prior to attaining breeding age, relatively few immatures are seen in or near breeding colonies. In Cape Cod colonies, O. L. Austin (1945: 24) found from his study of banded birds that: "Of the survivors of a season's hatch only 1.6 per cent breed the following year, 15.7 per cent the second, less than [one] out of five before the third."

This section on breeding is summarized from Palmer (1941b), with additions.

Ecology. In Maine, this species nests in a variety of situations on marine islands, usually inshore ones where there are areas of rock, turf, or soil, with at least some upright plant growth. Nests typically are on or near the edges of vegetation. Areas having few open spaces, and those with too much or too tall vegetation, are unsuited to the species, for, in the first place, these terns alight on an open space when coming to their nests, and, in the second place, much of the social behavior of a colony depends upon a bird being able to see its neighbors. In a colony where upright plant life is sparse, nests tend to be grouped near this vegetation.

Birds breeding at inland lakes usually nest on small islands, sometimes mere rocks having some vegetation, and room only for a single pair. "I have found two nests at inland waters on floating mats of vegetation such as uprooted bulrush clumps and root stalks of *Nuphar*" (Mendall).

Whereas young Common Terns, if frightened during the latter part of their preflight period, take to the water and swim readily, adult birds will alight on calm water but swim very little. During migration, Common Terns in small groups, as well as in fairly sizeable numbers, are seen offshore in flight or resting on the water, and sometimes little groups are seen perched on driftwood.

Common, Arctic, and Roseate Terns nest in the same colony, although Common and Arctic and Common and Roseate are the usual combinations. In a colony, each species is more or less segregated, mainly because the species differ as to preferred terrain, but all terns in a colony join in some social behavior—especially mass reactions to fear. The three species are gregarious and social during migration. All three are parasitized by jaegers, being forced by them to drop fish that they have caught.

History. In the following brief historical summary, Common, Arctic, and Roseate Terns are, for the most part, treated collectively. Two other points should be borne in mind. First, from the time of Nuttall, in 1834, to about 1884, most statements on tern distribution in the literature included the Arctic with the Common, since the former then was not generally known to breed as far south as Maine. Second, Machias Seal Island, which was expropriated by Canada in 1912, is included in all the tabulations.

Terns were breeding in numbers in the 1850's in and about the mouth of the Kennebec (probably Commons and some Arctics), on islands in Muscongus Bay (probably Commons and Arctics), at the Matinicus Islands (probably Arctics), at Matinicus Rock (undoubtedly Arctics), and at the Green Islands off western Penobscot Bay (probably Arctics and some Commons). Other colonies undoubtedly existed at this time, but records are lacking. There were colonies in eastern Washington County waters in 1861, at Machias Seal Island in 1873, and at the Green Islands in outer Casco Bay in 1874.

The first general slaughter of terns for the millinery trade occurred in 1883, but details of this killing are not available.

In 1885, the number of known breeding places on rocks and islands, from west to east along the coast, was as follows: one in Saco Bay; nine in Casco Bay; three in the mouth of the Kennebec; eight in Sheepscot Bay and vicinity; four in Muscongus Bay; two or more at the Georges Islands; at least 24 in inner and outer Penobscot Bay; three at the Matinicus Islands; seven in Jericho Bay; five in Bluehill Bay; two in the Petit Manan region; four in the Jonesport region; one in Englishmans Bay; two in the vicinity of Cutler (includes Machias Seal Island). There is no way of arriving at a satisfactory estimate of the breeding population for this total of over 75 colonies.

During 1886 and 1887, a large scale slaughter of terns occurred, from at least Casco Bay to Bluehill Bay and out to the Matinicus Islands. Several of the largest colonies were destroyed. In 1887, a party of men on one trip, mainly visiting islands in Jericho and Penobscot Bays, killed 1,134 terns (Commons and some Arctics), which were sold for millinery purposes at 30 cents each, making a total of $340 for the trip. A change in millinery fashion, and passage in 1889, by the Maine Legislature, of a law for the protection of terns, caused a temporary halt in the destruction. The law, however, seldom was enforced. Survivors from the severely persecuted colonies joined with others at colonies that had fared better, and some of these increased in size.

The known colonies (at least 31) in 1890 were located as follows: one in Saco Bay; four in Casco Bay; three in the mouth of the Kennebec; two or three in Sheepscot Bay and vicinity; two in Muscongus Bay; six in Penobscot Bay; five or more in Jericho Bay; three in Bluehill Bay; six from Petit Manan to Cutler. The demand for plumage was revived, and in the summer of 1899, some of the Casco Bay colonies, the three at the mouth of the Kennebec, and the Pumpkin Knob colony in Sheepscot Bay were destroyed. In 1900, there were only 23 known colonies, mostly rather small, from Saco Bay to Cutler.

After 1900, terns were not molested by man to any extent at most colonies. The birds were protected through the Thayer Fund and the National Audubon Society, which, by employing local guardians, attended to the enforcement of the "model bird law" enacted by the Maine Legislature of 1901. Herring Gulls shared the benefit of this protection, and, by 1911, had increased to the extent of establishing additional breeding colonies. As the gull population continued to expand, the terns were forced to occupy smaller and less suitable islands and ledges. The pressure of the gulls on the terns was very extensive by 1919. Terneries near the mainland suffered from rats eating the eggs, and from visits of picnickers who often brought along their dogs. There were not over 25 known breeding colonies in 1911, nearly half of them being on small islands and ledges. During the next 20 years there was considerable shifting about of colonies, but no over-all picture of the situation on the entire coast can be drawn from available data.

On their survey of the coast in 1931, Norton and Allen (1931: 591–592) found a total of 21 colonies, with the Common breeding in 20, the Arctic in six, and the Roseate in three. To their data I have added 1936 population figures for six islands, which they did not visit but where colonies undoubtedly existed, thus giving a total of 27 known colonies with estimated population (figures previously unpublished)

as follows: Arctic, 11,940 (in ten colonies); Common, 8,899 (in 25 colonies); and Roseate, 553 (in three colonies, plus one bird in a fourth). There was a mixed population in ten colonies, and only Common Terns in 17. Largest were: Stratton Island off Scarborough, 1,200 Commons; Garden Island, South Thomaston, Knox County, 2,000 Commons (1936); Matinicus Rock, 6,000 Arctics (1936); Trumpet Island in Tremont, Mt. Desert Island, 1,000 Commons; Foster Island, Machiasport, Washington County, 1,000 Arctics and 200 Commons; and Machias Seal Island, 3,800 Arctics, 200 Commons, and one Roseate. The other colonies contained from a few pairs to 800 birds.

More recent figures are not at hand, but it is known that some of the larger colonies have been reduced and a few smaller ones destroyed. In at least one instance, a large colony was nearly destroyed because numerous cats were allowed to run free by U. S. Coast Guard personnel during the late war. In other cases, known damage was due to encroachment of gulls, pasturing of sheep, destruction of eggs by rats, and wet weather in summer. There is a recent report that, in the only sizeable colony in Muscongus Bay, tern eggs were sprayed by a person who thought he was controlling the gull population. There is fairly good evidence that the rate of reduction of the breeding tern population has accelerated since 1940.

In preparing this history, literature and unpublished data have been summarized. A detailed history of terns in one section of the coast, Knox County, was written by Norton (1924: 95–100; 1925b: 1–3).

Remarks. These birds long have been known to breed on inland waters. Brewster (1924: 64), writing as of 1909, had indirect evidence that single pairs nested in Franklin County at least 26 years earlier—1884. Knight (1897d: 21) had reports of inland occurrence in three counties, and later (1908b: 58) in four counties, but these may have been based on migrants or transients, since breeding was not mentioned. First-hand reports of breeding begin with that of Harlow (*in* Dutcher, 1905b: 326), for about 200 birds nesting in the Mt. Kineo region of Moosehead Lake. No such numbers breed at any one inland locality at present.

Frequency of occurrence of food items in 155 Common Terns, collected at various coastal localities, were listed by Mendall (1935b: 9) as follows: fish (chiefly herring and mackerel), 71; shrimp, 62; insects, 17; small crustaceans (exclusive of lobsters and shrimps), 16; mollusks (chiefly snails and mussels), 12; empty, 11; berries and vegetation, 3; young lobsters, 3; and echinoderms (chiefly sea urchins and starfish), 2. At the Isles of Shoals in the summer of 1936, P. L. Wright (1937a: 20) noted that squirrel hake (*Urophysis chuss*) was a prominent item in

the diet of the terns. The reader is referred to Palmer (1941b: 13–18) for other facts regarding the food of the Common Tern in Maine, as well as data from other parts of the bird's range.

Possibly "*Plungeons*, a kind of water-fowl with a long reddish Bill," of Josselyn (1674; 1865b: 80) was the first mention of terns (of indeterminate species) in Maine. Williamson (1832: 145) introduced the word "*Medrake*" into the Maine literature, although none of our terns is as big as the bird he described. At the present time, fishermen use "Medrick" for any species of tern on our coast.

Report of occurrence of the Common Tern on March 24 at Biddeford (*in* Brownson, 1906d: 66) quite evidently is an error for May 24.

Some corrections to my own papers on the Common Tern follow. The word "unsuccessfully" should be substituted for "successfully" in the statement (1938: 118) referring to bad weather as a causative factor in the non-breeding at Little Green Island. That one bird may kill the other was meant in the statement (1941b: 54), referring to two terns engaged in territorial fighting, that sometimes they "kill each other." Although the tern population fluctuates, and there are various factors causing such fluctuations, I do not now believe, as previously stated (ibid. 34), that such changes are cyclic.

A few breeding Common and Arctic Terns seen in colonies have the adult winter (eclipse) plumage, but with the bright colors of feet and of bill characteristic of the nuptial plumage. A few other birds (Commons, Arctics, and Roseates) seen in colonies have the same plumage, but with dark soft parts, these birds being young that have not attained breeding age. I have discussed this matter at length (1941a), citing O. L. Austin's (1938: 21) very definite statement that, in Cape Cod colonies, breeding Common Terns of known age (13 years) differed in plumage from younger breeders, being of the adult type eclipse described above. On the basis of further study, Austin later (1942: 169–170), was equally explicit in stating that old breeding birds showed no differing characters of plumage or color of soft parts from younger breeders. "There may be a differential threshold of amounts of hormone necessary for the assumption of (1) the bright colors in bill, legs and feet, and (2) the full normal breeding plumage" (Palmer, 1941a: 171), but it is now established that an odd breeding plumage is not characteristic of old age.

I cited reports by O. L. Austin, Jr. and the Marples that terns had suffered from food shortages (1941b: 13), but Austin (1946: 20) stated that all writers, including himself, who had reported such cases, failed to present credible substantiating data in support of such statements.

Arctic Tern

Sterna paradisaea Pontoppidan

Summer resident, common to abundant on a few marine islands from Casco Bay eastward; *transient,* in spring and fall, in unknown numbers on marine waters, and rare in spring inland.

Spring. These terns usually first arrive at colonies from about May 16 to 22. In recent years at Machias Seal Island (Canadian territory), they have arrived May 17, except in 1947 when they arrived on the 12th (O. Hawksley). Arrivals continue into the first week of June or later.

Fall. Departure occurs chiefly in the first 25 days of August. Late dates of occurrence are: one shot on September 4, 1870, at Scarborough (Smith); and a few seen on September 4, 1890, at Metinic Green Island, and about 225 seen on September 9, 1931, at Metinic Island (Norton), both in Knox County.

Breeding. This colonial breeder prefers to nest in situations where there is little upright vegetation (see Ecology). Little or no nest is made. Most clutches consist of one egg, although two eggs sometimes are found, and very rarely three. Data at hand indicate that most clutches are completed from June 8 to 13. Both sexes incubate, the period being about 22 days.

At Machias Seal Island in the summer of 1947, O. Hawksley made the following observations on fledging periods. The range of ages at which young of known age made first flights was 27 (possibly 23) to 35 days. Most flew in 29 to 31 days. He wrote: "I had a few perfectly healthy birds that did not fly until their 35th day, although they had more feather area in their wings than they needed to make a first flight. The youngest bird actually seen in flight was 27 days old, but this same bird disappeared from its usual haunts on the 23rd day and was found in a place to which it certainly must have flown. To check the possibility of the bird having flown on the 23rd day, I compared the length of the unsheathed parts of its primaries with those of birds that were actually seen flying. Some of those seen flying had less feather area to support them than the bird in question."

The young are fed by both parents before and for a while after fledging. One brood is raised yearly.

Ecology. This species is typically an inhabitant of outer rocks and islands, and is a pelagic (trans-oceanic) migrant. The only satisfactory records of inland occurrence are those of Brewster (1924: 64–66) for spring occurrence (May 18 to June 18) in the Umbagog region and at Richardson Lake in Oxford County.

Of the three tern species nesting on marine islands in Maine, this one is the most capable flier, and the least given to walking after alighting. Characteristically, nests are in situations where there is very low vegetation or none, as on rubble, soil, or rock, and the birds alight directly at the eggs rather than nearby and then walking to them. Sizeable sandy areas do not exist at places where this tern nests in Maine, but elsewhere in its range, such places are utilized for breeding sites. In a mixed colony of Arctic and Common Terns, the former nest more or less as a unit on the areas where there is the least vegetation. (See Ecology under Northern Common Tern for further comparative data and for associates and social parasites.)

Remarks. This species is included in the historical discussion of tern colonies given previously (pages 268–270).

On outer islands where this species nests, weather conditions often are severe, and there is great mortality among young birds if a prolonged period of cold and damp weather occurs. Because of adverse weather conditions, very few young were raised in 1905, 1907, 1922, and 1937.

The third banding record which was evidence of trans-oceanic migration of this species, was for a bird, reported by Lincoln (1921: 454), that had been banded when in juvenal plumage on July 3, 1913, at Eastern Egg Rock in Muscongus Bay, by John C. Phillips, and found dead in August, 1917, in the delta of the Niger River, South Nigeria, West Africa. In Lincoln's note, this bird was stated erroneously to be a Common Tern.

Fish seems to be the staple diet of the Arctic about breeding colonies, but from the fact that I often have seen them swoop to the water's surface and evidently pick up small objects in their bills, I believe that small-sized marine organisms also form a sizeable portion of their diet. Norton (*in* Dutcher, 1904: 164) reported finding ants in several stomachs, and one stomach full of moths of the family Noctuidae; he also observed (Norton, 1909f: 439) these terns carrying skeleton shrimps (*Thysanopoda norvegica*) to their young, at Matinicus Rock in August.

Certain comments on plumage which apply to this species are given in the Remarks under the Northern Common Tern.

At Machias Seal Island in 1937, Pettingill (1939b) carried out a study on 100 nests of this species, from July 4 to his departure on the 28th. There were 144 unhatched eggs when he started, and of these, "91 eggs hatched young of which 23 fledged and probably left the island." The indication of hatching and becoming fledged in, at most, 24 days, is difficult to reconcile with Hawksley's findings, in the same locality, to the effect that most young required 29 to 31 days for fledging.

Northern Roseate Tern

Sterna dougallii dougallii Montagu

Summer resident, numerous or abundant at Bluff Island, off Scarborough, and at Upper and Lower Sugarloaf Islands in the mouth of the Kennebec River, and perhaps nesting in small numbers in other tern colonies, but at present known only to be an occasional visitant in summer and early fall seaward to Matinicus Rock and east to Machias Seal Island (the latter Canadian territory).

Spring. Few actual dates are at hand. Apparently this species arrives somewhat later than the Common Tern, from about May 24 into June. Two were seen on May 20, 1934, at Scarborough, and a few on May 25, 1937, at Georgetown, Sagadahoc County (Norton).

Fall. Considerable data for recent years show that migration occurs mainly from August 12 to 21. Late dates for large numbers are for about 400 on August 23 and 100 on the 26th, in 1938, seen by Norton at Scarborough. The three latest dates of occurrence, all for birds seen by Norton, are: a few on August 26 and September 6, 1939, at Scarborough; and one on September 16, 1939, at Popham Beach, Sagadahoc County.

Breeding. Few data are at hand for this colonial breeder. The pattern of courtship is much like that in the Common Tern, the most striking difference being that there is less aerial and more terrestrial activity in the Roseate. Birds were laying at the Sugarloaves during the second week in June, 1939, but I did not make a careful inspection of nests of this species until the 18th, when incubation was well begun. Eggs were laid in the vicinity of debris, in thickets of poison ivy, and under rocks. None of over 20 sets examined contained more than two eggs. Little or no nesting material had been accumulated in most instances. Two pairs nested near my blind, and it was observed that both sexes incubated. Eggs in two-egg clutches hatched at two-day intervals, which would indicate that incubation begins with the first egg. In the species' range outside of Maine, the incubation period has been reported variably as 21 to 26 days; probably there is considerable variation at any one locality. Apparently the fledging period is unrecorded. One brood is raised yearly.

Ecology. Of the three tern species nesting on marine islands in Maine, this one has the shortest wings and longest legs, and is the most active on the ground. Nests usually are in areas having a fair amount of vegetation which sometimes is quite dense. At the Sugarloaves, some Roseates nest under slabs of rock, the birds alighting in places where there is relatively little vegetation, then running out of sight to the eggs. At the present time, this species usually nests on islands

close to the mainland, but, judging from what is known of its habitat elsewhere, perhaps there would be less restriction to the shoreward area if more birds were present and/or there was no pressure from the gull population.

I find no records of inland occurrence.

For comparative data and remarks on sociability and social parasites, see Ecology under the Northern Common Tern.

Remarks. The first acceptable report of occurrence of this species in Maine is that of Brewster's (1879a: 15), who saw a small flock on July 20 [in 1878?] at the Green Islands in outer Casco Bay. Norton (1913: 574) summarized the few early records and reports. A marked increase in the population had occurred by 1925 (Norton, 1925d), and there appears to have been a slight increase since then. There was a total of about 552 of these terns nesting with Commons on Bluff Island and the Sugarloaves in 1931 (Norton). Probably the chief factor in the Roseates' increase at these three terneries was the fact that their nesting habitat is in fairly dense ground cover—for which there is practically no competition in terneries—and, in ecological succession, such areas become larger.

Jackson and Allan (1931: 18) reported about ten pairs of Roseates nesting in 1929 on Londoners Island in the New Hampshire part of the Isles of Shoals. The species was abundant there in 1935 and 1936 (P. L. Wright, 1937a: 31–32).

Eastern Sooty Tern

Sterna fuscata fuscata Linnaeus

One specimen was taken on October 5, 1878, at Parkman, Piscataquis County (Deane, 1880b: 64). There were at least three hurricanes between early September and early October of that year in the western Atlantic.

Eastern Least Tern

Sterna albifrons antillarum (Lesson)

Three sight records for recent years. Formerly a summer resident to Casco Bay and of rare occurrence eastward into Washington County.

Records. An unstated number was seen on July 10, 1933, twenty miles northeast of Portland (records of the Nuttall Ornithological Club); two were seen on August 14, 1938, in Muscongus Bay (Cruickshank; J. Cadbury); and several were seen on July 30, 1947, at Small Point, in Phippsburg, Sagadahoc County (G. Loring).

Remarks. N. C. Brown (1882f: 35) wrote: "This beautiful little species formerly occurred every year at the Green Islands [in outer Casco Bay]. It is now extremely rare—in fact, for a number of years I have not seen a single specimen." According to Boardman (*in* Baird, Brewer, and Ridgway, 1884, 2: 310), the species was "occasionally seen in midsummer as far east at the St. Croix." The last record for the previous century was for one bird seen by Ralph H. Norton in June, 1897, at Damariscove Island, off Boothbay Harbor, Lincoln County.

This tern was nearly extirpated by feather hunters from all of its range north of Virginia, but has increased greatly under protection. Since it may have nested in New Hampshire in 1932 (Shelley, 1932b), and now nests as near as Ipswich, Massachusetts, one would expect to see it occasionally (at least in early fall) along the beaches of southwestern Maine.

On September 15, 1944, after a hurricane that carried many Skimmers to Maine, many Least Terns were seen in New Brunswick waters, but none was reported for Maine.

Caspian Tern

Hydroprogne caspia (Pallas)

Rare transient, more records for fall than for spring.

Spring. An adult female was shot on May 11, 1901, at Clapboard Island, Falmouth, Cumberland County (Swain, 1901d: 29). Another was taken on an unknown spring date prior to 1905, near Richmond Island off Cape Elizabeth (Norton, 1905b and 1908d).

Fall. Norton saw one on July 17, 1938, at Scarborough. Three were seen in August, 1893, near Seguin (Spinney, 1899b: 19). Two were seen on August 22, 1941, at Sharp Rock in eastern Muscongus Bay (Cruickshank). Five were seen (three shot) "the last of August," 1884, at Georgetown, Sagadahoc County (Spinney, ibid.). One was seen on September 6, 1916, at Freeport, Cumberland County (W. C. Kendall). Two were seen on September 15, 1940, at Cape Porpoise, York County (R. N. Lake). One was seen on September 15, 1944, at Pemaquid Point, Lincoln County, as reported to Cruickshank. One was shot a few days before October 17, 1908, in eastern Casco Bay (Norton, 1908d). Two undated late summer or fall records are: one shot in 1884 or 1885 in Wheeler's Bay, Knox County (Norton, 1925b: 3); and another in 1895 near Richmond Island (Norton, 1897b: 104).

Ecology. The scant data at hand indicate that this bird is marine in habits when in our waters.

Remarks. Of this species in Maine, Verrill (1862b: 160) wrote: "Coast in winter; rare." On Boardman's authority, Baird, Brewer, and Ridgway (1884, 2: 282) stated that "individuals have been occasionally taken in the Bay of Fundy."

About a half dozen large terns, tentatively referred to this species, were seen on August 10, 1929, in Frenchmans Bay, Hancock County (May, 1929: 340).

American Black Tern

Chlidonias niger surinamensis (Gmelin)

Transient and/or visitant, rare in late spring and early summer and uncommon in fall; *breeds* at one locality in Kennebec County.

Spring. A number seen on May 16, 1947, at the southern end of Lake Messalonskee, Belgrade, Kennebec County (A. Gross, 1947c: 24), is the earliest record for this season. There are a number of undated spring records, for several decades ago, but no other specific dates than the above are at hand for earlier than June 22.

Fall. Most records are for August. For the period 1865 to 1945, in which none were known to breed in Maine, I find 27 occurrences for July 23 to September 15. Seventeen are for single birds, one for three, one for four, and five ranging from "several" to the several flocks seen by Norton (1916: 378) on September 5, 1913, off Casco Bay. Most records are for Cumberland and York Counties and for near salt water there, although the species has been seen as far inland as Jackman, Somerset County (A. R. Phillips), east to Castine, Hancock County (R. Howe, 1902), and one at Machias Seal Island (Moses, 1908: 91), which is Canadian territory but within the scope of the present paper (see page 11).

Breeding and summer. On July 22, 1946, A. L. Grover and G. P. Milne captured a chick, estimated to be four to six days old, in the extensive marsh at the southern end of Lake Messalonskee. On June 28, 1947, Grover, Milne, and Gross found two nests, each with three eggs, and they suspected, from the fact that five adult birds were seen, that a third nest might be present (A. Gross, 1947c). "In this part of the marsh the grass is sparse and there seemed no place firm enough to support the home of a pair of terns in this expanse of water alive with pickerel and bull frogs. There were, however, small floating islands of accumulated dead vegetation and it was on one of these islands, about five by twelve feet in extent, that we found the first nest containing three eggs. The nest was well exposed and not at all concealed by growing vegetation. The nest, about five by six inches in size, was a shallow, crude mass of grass stems and pieces of cattail

stalks placed directly on the soggy mass of floating rotted vegetation . . . The birds of this nest did not exhibit unusual alarm while we photographed the nest and later returned to the nest again and again as we remained in the canoe at a distance of not more than thirty feet.

"A second nest, also with three eggs, was found on a similar mass of dead vegetation about seventy-five yards from the first nest. The second nest was of better construction, it was somewhat larger and more deeply cupped. It was made up of stems of marsh grass" (ibid. 25).

Incubation, by both sexes, requires 17 days, as reported outside of Maine (Chapman *in* Forbush, 1925: 129). The fledging period, which is probably about 26 days, apparently is unrecorded. The species probably raises only one brood yearly in Maine.

There are several late June and early July occurrences inland for the years prior to establishment of a breeding record.

Ecology. Several birds have been seen inland hawking for insects over marshes. Elsewhere, they have been seen at ponds near the ocean, as at Scarborough, or over the ocean, sometimes associating with Common Terns. Several of these terns, shot off Casco Bay in 1913 (see Fall) "had maggots in their stomachs, probably *Caelopa frigida*, which breeds on the beaches in the stranded and rotting seaweed" (Norton, 1916: 378). Another, shot by Norton on August 23, 1916, off Casco Bay, had eaten insects and a leech. Some have been seen to pick up small objects from the surface of the ocean.

Remarks. The basis for certain indefinite statements of occurrence of this species in Maine cannot be established from available information.

This species was found nesting in New Brunswick in 1940 (H. S. Peters, 1941b). The increase in records of occurrence in Maine since 1934 would indicate that a few of these terns have bred in the northeast for some years.

Family RHYNCHOPIDAE

Northern Black Skimmer

Rhynchops nigra nigra Linnaeus

Hurricane visitant, with one possible exception.

Records. There was a hurricane, with unusually high wind velocities, that crossed the Gulf of Maine August 16 to 30, 1879. On August 28, one of two skimmers seen was shot at "Wells Bay" [Wells Beach], York County (Smith, 1882–83: 205). Boardman, in a letter of August 31, wrote that there had been a flight and seven skimmers had been

killed in New Brunswick waters, and on this same date, Deane saw one about ten miles at sea off Saco, York County (Deane, 1879d).

I find no report of a hurricane reaching the Gulf of Maine in the summer of 1881, when, according to Smith (op. cit.), one of these birds was shot near Matinicus, Knox County.

Norton (1925a) listed the following occurrences, after the hurricane that swept through the Gulf August 26 and 27, 1924: in the last few days of August, one of three skimmers shot, the other two remaining for several days, about three miles from Jonesport, Washington County, and after their disappearance, two seen 12 miles eastward in Machias Bay; one shot on September 1 at Lubec, in the same county, another on the 2nd at Jonesport, and "about the same time," a third at Stonington, Hancock County; and three seen on August 30, eight on September 1, and three on the 5th, at Popham Beach, Sagadahoc County. Probably some birds are duplicated in these counts. Lermond (1924) reported one shot on September 7, 1924, at South Thomaston, Knox County.

Following the hurricane of September 14, 1944, which brought several hundred skimmers to New England and about 50 as far east as Kent Island, New Brunswick, Hill (1945: 410) listed these Maine occurrences: on September 15, twenty at Ocean Park, York County, and one at Isle au Haut, Knox County; on the 16th, twenty at Scarborough, and hundreds at Blue Hill, Hancock County; and on the 17th, one at Swan Island, Hancock County. According to Cruickshank, three were seen from September 15 to 17, at Pemaquid Point, Lincoln County.

Remarks. One would expect this bird to become a post-breeding visitant in time, for Hagar (1946b) has reported it breeding as near as Plymouth, Massachusetts, in 1945.

Family ALCIDAE

Great Auk

Pinguinus impennis Linnaeus

Extinct. Probably was resident, but the only definite records are for late spring.

Remarks. Norton's Knox County notes (1924: 1–4) on this bird are here quoted. I have placed the references, and one footnote, in parentheses (instead of footnotes as he had them), and made a few corrections in accordance with those in Norton's personal copy of the account as published, and added certain data in brackets.

"Though the Great Auk, Penguin or Wobble, has long since been extinct, it should not be forgotten that it formerly was a part of the bird life of the region under consideration.

"This was attested by James Rosier, 'a gentleman employed in the voyage' of Captain George Waymouth; Rosier (1605; 1887 reprint, 159) mentioned Penguins among the 'Profits we saw the Country yeeld in the small time of our stay there.'

"This stay was from May 17 to June 16, 1605 in the vicinity of the Georges Islands, during which time the party explored not only the Georges River but among the islands for five or six leagues. On one of the islands, evidently quite near their anchorage, they found extinct camp fires and kitchen refuse, among which were the shells of eggs 'bigger than goose eggs.' [See Rosier's description of finding the shells, quoted on page 181].

"According to the measurements given in works on oölogy, but very few North American birds produce eggs that size, hardly half a dozen genera, including the present bird, the swans and cranes.

"To complicate the probable identification of these big eggs Rosier has included three birds ["Penguins," "Swannes," "Cranes"] that might lay eggs of that size among the 'Profits' seen.

"In any event, the Penguin must have been somewhat numerous to have been mentioned among the country's 'Profits' or resources.

"We are not aware at this time that any other definite reference to the occurrence of the bird in this region has appeared in print. Since, however, its remains are the most abundant and universal bird remains to be found in the kitchen middings of the bays, both east and west of Knox County [Wyman, 1868; Baird, 1881; Loomis and Young, 1912; and others], there can be no doubt that bones of the bird will be found here when the proper places have been examined.

"Considerable mental effort and printer's ink have been expended to support the assumption that the Great Auk occurred in the Gulf of Maine more or less commonly in winter, but casually or accidentally in spring or summer. As a matter of fact, about all the definite records of the bird's occurrence in the Gulf of Maine are *late* spring records.

"These include the well debated Gosnold (1843: 72, 75) records at sea and near Cape Cod, with definite dates May 7 and 20 respectively, the Rosier record at Georges Islands at a time not earlier than May 17, the Champlain (Bourne ed., 1906: 69) record near Cape Sable, Nova Scotia, about May 20, and Josselyn's record of 'spring' (1672; 1865a: 45).

"Champlain, after citing the taking of a barrel of cormorant eggs says of another island [? one of the Tusket Islands south of Yarmouth, Nova Scotia], 'there are so many birds called penguins that one can

easily kill them with a stick.' The Slafter translation says, 'we killed them easily with sticks' (Champlain, 1878: 13–14). With a barrel of eggs aboard, fresh meat and not more eggs was the object of the explorers.

"If migrants or pensioners (. . . A term applied on this coast to the birds summering far south of their breeding grounds), as a recent essay (Townsend *in* Bent, 1919: 209) would have it, why were these Penguins ashore in such numbers on a *particular* island, and not scattered along the reefs and ledges, which by their numbers and threatening aspect thrilled these navigators of uncharted seas?

"Grieve (1885: 73) says that 'the egg . . . was hatched out by the middle of June.' This statement was evidently based upon the observations of M. Martin at St. Kilda, 57° 49′ N [Outer Hebrides]. According to Grieve, Martin says that the bird came to the island the beginning of May and departed about the middle of June (ibid. 65).

"Even granting that certain of the Alcidae begin laying a week or ten days earlier among the British Isles than the same species do in the Gulf of St. Lawrence,—as there seems to be some evidence that they do—it was within the breeding season of the species that Rosier found his big eggs at Georges Islands, and that Champlain's crew killed their Penguins in Nova Scotia.

In 1888, Miss Hardy (1888: 384), (Mrs. Fannie Hardy Eckstorm), produced the evidence of the shell heaps or kitchen middings, as showing the rather common occurrence of the Great Auk along our shores in summer, and prophesied that time would prove the bird to have been a resident. [Nearly all additions to the heaps were made during the summer, as the Indians dwelt at these sites from perhaps some time in May to early fall, then returned to their inland villages.] In so far as her contention applies to the rather common occurrence of the bird here in summer (and its probable breeding), her position has been considerably strengthened with the passage of time.

"Her views are mentioned, merely to be dismissed with a wave of the hand, in the most recent essay (Townsend *in* Bent, 1919: 209) on the bird, and most bibliographers have religiously refrained from any mention of such heresy in their compilations.

"In supporting the assumption that the bird was a winter sojourner in the Gulf of Maine, Dr. Charles W. Townsend distorts, (inadvertently we believe), Josselyn's oft quoted statement, unless indeed he has some Josselyniana not so well known as the two familiar works of that author: the bibliography gives no hint of the source.

"Since Dr. Townsend says that 'Josselyn says one was taken at Black Point, near Portland, Maine' (ibid.), it seems desirable to quote in full once more just what Josselyn did say.

" 'The *Wobble*, an ill shaped Fowl, having no long Feathers in their Pinions, which is the reason they cannot fly, not much unlike the *Pengwin*; they are in the Spring very fat, or rather oyly, but pull'd and garbidg'd, and laid to the Fire to roast, they yield not one drop' [Josselyn, 1672; 1865a: 45].

"In the Voyages [1674; 1865b: 80] but a nominal mention of the Wobble is given. It is plain that Sir John has written in general or plural terms, of a common subject; he was indeed quick to enlarge on the rare or unusual, and proclaim its 'soveraign vertures.' Had a single Wobble fallen beneath his eye, it would have met with no casual dismissal as these birds did.

"We do believe however that the bird was a winter, as well as a summer resident in this region and elsewhere in the Gulf of Maine—if indeed we are justified in believing without definite data that it did occur here in winter. In 1875 the late Dr. T. M. Brewer (1875: 450), on what grounds we are not informed, did mention it as a former resident of New England.

"We have mentioned the belief that this species, like the Sea Pigeon [Black Guillemot] fed from bottom (Norton, 1923b: 2). One reason for this belief is based upon the fact that the bird's bones are found commonly in the summer camps well within the confines of the bays, where we should not find the remains of the more pelagic Auks. A bird feeding in the shallow water, as the Cormorants do and on the same food, would occur commonly just where the Great Auk bones have been most numerously found.

"Fabricius, one of the very few authors who has been specific concerning the bird's food in a state of nature, says that it fed on Sculpins [Cottidae], Lumps [*Cyclopterus lumpus*] and other fishes of similar size (1780: 82).

"Grieve (1885: 72), has questioned that the first two fishes could have formed the bird's principal food on the ground that the spines of these fishes would have rendered them impossible as a common diet.

"Since we know from numerous dissections that Cormorants do subsist largely on Sculpins, the most formidable of the two, we can readily accept the statement of Fabricius as correct.

"From another point of view Dr. Lucas (1888: 282) reaches the conclusion that the Lump Fish would not have been difficult for the Great Auk to manage. Moreover, in spring when Josselyn's Wobbles were particularly 'oyly,' these fat Lumps were spawning along the sheltered rocky shores just below low water mark. Their pursuit or rather capture would bring the Wobble, Penguin or Great Auk to the places where its remains are commonly found.

"The statement of several early writers that these birds were not

found outside of soundings, though vague, may have been based upon this very habit."

To Norton's account I would add the following comments.

Forbush (1912: 405) quoted Davis' account in the *History of Warcham, Massachusetts,* of how Indians got Penguins by trapping them in a weir across an inlet, then killing them with clubs after the tide had receded. This is further evidence of the bird's littoral habits.

Rosier stated that the Georges Islands were wooded except for a fringe of grass and bushes. The Matinicus Islands, farther seaward, however, were covered mainly with low vegetation, the Indian name for them signifying grassy islands (F. H. Eckstorm, 1941: 99), and would have provided good nesting grounds for the Great Auk. Monhegan, farther at sea, where Rosier found not only big egg shells but also various kinds of birds breeding on the shores and rocks, perhaps was mostly wooded, but its borders and surrounding low ledges probably were suitable nesting sites, and there was sufficient water of the proper depth thereabouts to have met the requirements of this species. It has seemed to me that Indians, who were admirable canoeists and whalers, may have camped at the Georges Islands when coming or going to one of the more seaward places just mentioned. This could account for egg shells, fish bones, etc., where fire had been made, at the two places mentioned by Rosier.

Speck (1921: 350) suggested that the mythical bird *Gellu* in the legends of the Penobscots was based upon the Great Auk, and Mrs. Eckstorm (1936: 138–140) associated it with an eagle.

Northern Razor-billed Auk

Alca torda torda Linnaeus

In *summer,* a few present but not definitely known to breed at Machias Seal Island (Canadian territory), and rare non-breeder westward to Muscongus Bay; *transient* and *winter resident,* uncommon to occasionally fairly common in inner offshore waters; one inland record.

Migrations. Beginning by mid-September, there apparently is a dispersal of birds from Machias Seal Island and from the breeding colony at Yellow Murr Ledge, both in New Brunswick waters, which would account for most of the birds seen in eastern Maine waters in early fall. A migratory movement, often composed largely of birds of the year, extends from late October well into December. The earliest date at hand for the vicinity of Portland is November 25, 1891, when Norton shot a female at Trundys Reef.

There is a general withdrawal of Razor-bills toward their breeding grounds in February and early March.

Summer. Quite a few pairs spend the summer in the vicinity of Machias Seal Island. In 1947, a few were seen there nearly every day; the keeper of the light stated that about 20 pairs bred there, but no certain evidence of this was found (O. Hawksley). Cruickshank has three summer records for Muscongus Bay, and there are a few scattered records for more easterly points, including uncertain evidence of at least one pair occasionally summering at Matinicus Rock.

Winter. The number seen along the coast at this season varies considerably from year to year, which would seem to indicate that the population from the mouth of the Bay of Fundy occasionally is augmented by other birds from more distant colonies.

Ecology. Outside the breeding season, this is a bird of offshore waters. It is not pelagic, however, nor does it then prefer the vicinity of islands, as is sometimes stated. It feeds in the plankton and nekton zones.

Remarks. A specimen in nuptial plumage was taken on May 31, 1910, on a pond in Winthrop, Kennebec County, and is now in the State Museum at Augusta.

After having visited the mouth of the Bay of Fundy in 1833, Audubon (1835: 112) reported that "some breed on the Seal Islands off the entrance of the Bay of Fundy." Having visited the same area in 1871 and 1872, H. Herrick (1873: 41) reported this species as "still common about the Murre rocks and Seal Islands where it breeds without much molestation." It is not known when they ceased breeding at the latter places.

In 1908, Knight (1908b: 36) reported a "dimly verified statement that some fifty years ago or more," these birds nested "as far south as the Cranberry Islands," off Mt. Desert Island. That they nested farther westward was shown by Norton (1923b: 35), who wrote that, "at least occasionally," this species bred in Knox County "as late as the 80s when a pair summered at Metinic Green Island where an egg [and an adult bird] was collected [by Rackliff]. About the same time a pair in nuptial plumage passed the summer at the Western Egg Rock [Lincoln County, Muscongus Bay] . . . A little earlier a pair in nuptial plumage passed the summer at the Little Green Island [off South Thomaston, Knox County]." From 1894 to 1923, when he wrote his report, Norton saw no Razor-bills in summer in Maine waters, nor had he received any reports of their occurrence.

On July 15, 1911, one of these birds was seen at Machias Seal Island (Pearson, 1911: 277). Here in 1922, "Samuel Harvey noticed an egg in the resident colony of Puffins which, from his description, seems to be unquestionably that of the Razor-billed Auk" (Pettingill, 1939a: 346). Norton and Allen (1931: 591) listed the island as a breeding

colony in 1931, because of a small number of these birds having been present that summer. Actually, however, no eggs were found. Pettingill (op. cit.) wrote: "During July, 1937, Razor-billed Auks were seen daily resting along the shore bordering the Puffin colony. Several times they were actually noticed to alight on the ledges in the midst of the colony; but none of them were ever seen to disappear among the crevices where the Puffins were nesting." Mrs. Elizabeth Dodge told Norton that she saw no Razor-bills there the second week in July, 1939. On August 25, however, 25 pairs were present (W. R. Peabody). For August, 1940, the keeper of the light reported that 75 pairs were present and that that was the "normal" number. The most recent data are given above under Summer.

Atlantic Murre

Uria aalge aalge (Pontoppidan)

Rare *winter resident* offshore, seldom straggling inshore. Few definite records, none being recent.

Records. A specimen in nuptial plumage, in the collection of the Portland Society of Natural History, was recorded by N. C. Brown (1882f: 36) as an adult taken "a few years ago" off the coast of Searborough. On February 7, 1882, a female was taken at South Bristol, and on March 11, 1882, N. A. Eddy received a female in the flesh from Bristol, both in Lincoln County (Norton). An adult, shot on December 14, 1884, off Cutler, Washington County, is also in the Portland collection. Norton (1923b: 32) recorded a specimen seen by him in the 1880's or 1890's, which was collected in southwestern Penobscot Bay. This was shot by Rackliff before 1890.

Ecology. This is an offshore bird in winter, feeding in the nekton zone.

Remarks. Bryant (1861: 138) probably was correct in stating that, in winter, this species was "abundant on the coast of Maine," for it bred off southern Nova Scotia, in New Brunswick waters, and very likely in Maine in his time. Norton (op. cit.) reported that, prior to 1870, this Murre bred on the Green Islands, off western Penobscot Bay. (See also Remarks under Brünnich's Thick-billed Murre for comments on Hardy's report of that species breeding east of Penobscot Bay).

Brewster (1887b) reported three Atlantic Murres, received in the flesh in Boston on December 27, 1886, from a gunner at Eastport, Washington County. They may have been taken in New Brunswick waters.

There are one or two recent sight records for this bird, but I consider them questionable.

Uria affinis (Marsh)

A *fossil* right humerus, which Dr. A. C. Hamlin found in the Pleistocene marine clay near Bangor, was described as a new species, *Cataraactes affinis*, by Marsh (1872: 256). The bone was figured by Shufeldt (1915, fig. 60 on plate 8, opp. p. 92).

Brünnich's Thick-billed Murre

Uria lomvia lomvia (Linnaeus)

Transient and *winter resident*, fairly common to occasionally rather numerous in offshore and uncommon in inshore waters. Often driven ashore by storms, when birds have been found as far inland as Aroostook County.

Migrations and winter. During the southward movements, birds reach our waters in November and early December, the earliest record being for a bird seen by Norton on November 5, 1909, at Scarborough. In winter, numbers seen usually are scattered, seldom more than a half dozen being in sight at one time. The birds depart in February and early March, the latest record being for a bird seen by Spinney on March 27, 1897, at Seguin.

Ecology. This is an offshore and pelagic species, getting its food in the nekton zone. They raise their wings before diving, like Puffins, and dip their bills when swimming, like Guillemots (Norton). The species is rather gregarious in winter, but not markedly so.

Remarks. Hardy (1897) wrote: "I will say that over 50 years ago my father obtained the egg and parent of the Brünnich Murre at either one of the Duck Islands or Marshall's Island in Penobscot Bay. I think I have the identical egg in my collection, but am unable to look it up at present." These localities are east of Penobscot Bay, in Hancock County. This report was considered doubtful by G. M. Allen (1909: 6), to refer to the Atlantic Murre by Norton (1923: 33), and to refer to the Razor-bill by Bond.

Of the many inland occurrences, some have been published by Knight (1897d: 16; 1908b: 35), Kilburn (1922b: 116), Brewster (1924: 54–55), and several others. Since most reports for birds inland have been for single individuals, Kilburn's mention of a "small flock" in December, 1908, in an open brook at Fort Fairfield, and another at Presque Isle in January, 1918, are very unusual.

There is a recent summer sight record which I consider questionable.

Common Dovekie

Plautus alle alle (Linnaeus)

Transient and *winter resident*, varying in different years from rather uncommon to numerous in offshore waters, and, usually after storms, rare to occasionally rather common inshore and inland (subject to incursions); three *summer* records.

Fall. After a gale in September, 1869, one of these birds was picked up alive at Gorham, Cumberland County (Smith, 1882–83: 223). Usually, however, the first birds reach our waters during the last five days of October. Migration continues into December.

Spring. The withdrawal from our waters probably begins in February, since most birds are gone by March 15. The latest record for Casco Bay is for eight birds seen by G. R. Meyer on March 9, 1913, off Great Diamond Light, and farther eastward near Mt. Desert Island, Weston saw one on March 27, 1944.

Incursions. Although this species appears inshore in numbers at intervals, occurrence is greatest during prolonged periods of unfavorable weather when plankton organisms go to deeper levels, and the Dovekie must seek elsewhere for food. Under these conditions, however, they usually move out again in a few days. On other occasions, during prolonged gales, many emaciated birds are washed ashore, dead or exhausted, and others fly inland, usually not surviving to reach the sea again. Noteworthy inshore and landward movements have occurred as follows: *1871*, many seen inshore and others inland in mid-November (Smith); *1878*, many in Portland Harbor in December when it was stormy at sea (Smith); *1901*, more abundant in mid-November than ever seen before about Seguin (Spinney); *1902*, many about Seguin on December 7, and all birds gone by the end of the month (Spinney); *1913*, many wantonly killed in harbors and along the shore in Washington County during the last week of December (C. H. Clark); *1917*, the waters about Portland Lightship "covered" with Dovekies in mid-November (W. Richards); *1931–32*, many ashore and many in inshore waters from late November until early January (various observers; Murphy and Vogt, 1933); *1932*, many ashore from November 12 to 18 (various observers); *1936–37*, common to numerous inshore from December to January (Norton and others); and in *1945*, a small flight ashore in southwestern counties in early December (various observers). These occasions do not include the many years when a small number have been found on or near land.

Summer. The first two records of summer occurrence, published by Norton (1911d), were: a Dovekie seen frequently during the summer of 1910, near Matinicus Rock, by Captain M. Tolman, keeper of the

light there; and, on July 15, 1911, about half way between Machias Seal Island and Cross Island in Washington County, Norton and T. Gilbert Pearson collected a male and female, both in "fair bodily condition," but it was doubtful that "they could have flown." W. R. Peabody saw a single bird on May 30, 1937, off Ogunquit, York County.

Winter. At this season, small flocks, as well as scattered individuals, are seen.

Ecology. This species is typically a pelagic and offshore bird in winter, and primarily a plankton feeder. On one occasion, when driven inshore for food, some of these birds were observed feeding on amphipods in the surf (Norton). When driven ashore, they are usually too exhausted to return to the sea, although a healthy bird is capable of taking flight from a hard surface, such as ice or firmly packed snow. The species is gregarious in winter.

Southern Black Guillemot

Cepphus grylle atlantis Salomonsen

Resident (adults subject to dispersal movements), a fairly common to numerous breeder from Muscongus Bay eastward on islands, and non-breeding birds occasional to uncommon westward in summer; migrant birds are young from the state and *transients* from elsewhere; some birds from outside the state are *winter residents* in our waters. A somewhat rare straggler ashore and inland in fall and winter.

Spring. Return to the vicinity of breeding places occurs throughout April and to about May 4.

Fall. The movement at this season is mainly a dispersal from breeding places, beginning in early August shortly after the young are afloat. Later, there appears to be a rather vague southward shift, of at least part of the population, which probably is interrelated with changes in the supply of available food.

Breeding and summer. The eggs are laid in crevices, or under boulders or loose slabs of rock, generally on rocky and, preferably, steep shores of islands. The site, between high tide line and the edge of vegetation, usually is as near the water as a dry spot can be found. Several pairs may occupy sites near each other, this probably brought about by a shortage of suitable sites, for the species hardly can be called colonial. No real nest is made, but perhaps a few stones, sticks, or bits of seaweed may be gathered together where the eggs (usually two) are laid. Clutches usually are completed from about June 10 to 18. Both sexes incubate, and, since there is an interval between hatchings, incubation must begin before the clutch is completed. At

Kent Island, New Brunswick, the incubation period was observed to be about 21 days (Winn, 1947: 163). The fledging period, apparently unrecorded, is probably slightly over four weeks. One brood is raised yearly.

A few birds, either non-breeders or those whose nesting has been interrupted, are seen in summer at points west of the breeding range to the Isles of Shoals.

Winter. According to Norton (1923b: 32), these birds spend the whole of this season afloat, "scattering widely in the vicinity of outer shores and shoals," and, when "sudden gales break upon the open sea, . . may be seen speeding their curious wallowing flight to the lee of some island or reef, where they congregate in some numbers, until the gale moderates or impulse impels them to move away to some other quarter."

Ecology. "When breeding the birds feed to a considerable extent in the adjacent offing just beyond the line of breakers, diving to bottom, for the Rock Eels [*Pholis gunnellus*], . . and other animals on which they feed. Yet they are by no means strikingly sedentary in this respect as they also resort to outer shoals at some distance. Such a shoal (which is also a fishing ground), about two miles south of the Green Islands [Knox County], is known as the Pigeon Ground" (ibid. 31–32).

At any season on the water they generally are found singly or in small groups. Young birds tend to come closer to the mainland than do adults, even swimming up river mouths. Since eggs are laid in fairly isolated rocky places, this habitat requirement tends to restrict the westward extension of the species' breeding range in the state.

Remarks. This bird has been known on our coast since Josselyn (1674; 1865b: 80) mentioned "*Doies,*" referring to the sea doves or sea pigeons. We know almost nothing of its early history in Maine, except that, perhaps, it was at one time restricted to Hancock County as a breeding bird. Norton's statement (1923b: 31) to the effect that there had been little change in the number of these birds in Maine during the preceding 70 years should be modified, for there has been a gradual increase since about 1910. Knight (1899b: 36), after a partial survey on the coast, gave a total of 164 birds for five islands, plus 300 to 400 pairs on Little Duck Island, off Mt. Desert Island. Norton believed, no doubt correctly, that Knight's estimates for larger colonies were much too high. Norton reported (*in* Dutcher, 1904: 149–157) that in 1903 he found this bird nesting on 14 islands and ledges from Metinic Green Island, Knox County, eastward, with a total of about 150 breeding birds. In 1907, he found them breeding at about 16 localities.

In 1931, Norton and Robert P. Allen found this species breeding on 24 islands and ledges, from Western Egg Rock, Lincoln County, in Muscongus Bay, eastward, with a total of about 600 birds, the largest colonies being 100 birds at Little Duck Island and 150 at Matinicus Rock. In their report (Norton and Allen, 1931: 591), they listed the guillemot as "breeding generally along the coast." Recently, Cruickshank (1938: 551) stated that at least 75 pairs were nesting on islands in Muscongus Bay alone. The latest figure is about 200 pairs nesting there in 1947 (Cruickshank). It is possible that a few pairs may nest as far westward as Seguin, but probably non-breeding birds have been mistaken for breeders, since no eggs or young have been reported. Perhaps 250 pairs now (1948) nest in the state. Little Duck Island is the largest colony.

On August 12, 1935, Norton timed 15 submergences at Long Island, off Mt. Desert Island. The water was three or more fathoms deep, and the average period of submergence was 35 seconds (minimum, 32; maximum, 56). Of nine other dives, in winter, in four to nine fathoms, the average time was 48 seconds (minimum, 32; maximum, 64).

"Toward nightfall one day in July, 1902, from the deck of the steamer 'Frank Jones,' plying between Portland and Machiasport, the writer saw some Sea Pigeons . . . feeding off the outer point of Schoodic Island. The boat was bound east and on her approach the birds were on the port side; they flew east across her bow, then swung away, heading to the southwestward, disappearing in the distance far out over deep water. That they were homeward bound is indicated by the lateness of the hour and the directness of their flight out over the open sea, toward Little Duck Island, nineteen miles distant, where the nearest breeding place was located" (Norton, 1923a: 13).

Off western Penobscot Bay, "for a number of years prior to and including 1885 an albinistic specimen was a regular summer resident at the Little Green Island, evidently breeding there at the Northwest Head" (Norton, 1923b: 32).

A Maine specimen referred to the race *mandti* by Swain (1900d), was a Black Guillemot (G. M. Allen, 1909: 222).

Atlantic Puffin

Fratercula arctica arctica Linnaeus

Resident (subject to dispersal movements), a numerous breeder at Matinicus Rock and abundant at Machias Seal Island (Canadian territory, but within the scope of this paper); some birds from more distant points are *winter residents* in our waters.

Migrations. Both migrations might better be called dispersals, the birds scattering in October and gathering in March and April, probably almost none having gone over 300 miles from the breeding places.

At and around Machias Seal Island, they are "very regular in dates of their arrival, each year appearing off the islands about May 17, where they keep to the water for four or five days, then come ashore" (F. A. Brown, 1911: 242). For the same place, Pettingill, who also got his data from a light keeper there, stated (1939a: 347) that they arrived "about April 20," but did not alight on the rocks of their breeding grounds "until May 1."

In fall, the birds depart from Machias Seal Island "about October 1" (F. A. Brown, op. cit.). They do not come ashore much after the young are flying, and depart from the area in late September or early October (S. Harvey). In his notes for August 27, 1936, Norton recorded that all birds "had departed from the breeding 'grounds,' but they are said to come to the rocks at night."

Breeding. Usually the one egg is laid in a hole or under a rock, the latter situation being used almost exclusively in our area at present. Laying dates are not known. On June 3, 1935, Pettingill (1939a: 347) found three eggs at Machias Seal Island; Bent (1919: 96) gave egg dates from Maine as June 19 and July 27. The latter date probably is based on a partly incubated egg and another near hatching, taken on July 27, 1902, at Machias Seal Island, and in the Norton collection. American records of the incubation period, varying from a month to 36 days, need checking, especially since 40 to 43 days was given for the British race by Lockley (*in* Witherby, 1941: 170).

For Machias Seal Island, in the summer of 1947, Oscar Hawksley reported: a broken egg containing an embryo near hatching age on June 26; a five- or six-day-old chick on the 30th; and on July 1, an egg hatched that had been pipped the preceding day, and a fresh egg which was, perhaps, the result of an earlier one having been destroyed. Hawksley believed that some young hatched earlier than the chick seen on June 30, for some were flying by August 2, and many were on the water on August 6. The fledging period apparently is unrecorded, but probably is over six weeks. One brood is raised yearly.

Winter. These birds pass the winter in offshore and outer inshore waters, occasionally straggling close to the mainland.

Ecology. The Puffin is a colonial nester, confined to rocky places at present. In winter, the food is "either fish or other forms of marine life including small crustaceans" (Knight, 1908b: 31), and is secured at various depths. Apparently the Puffin prefers fairly deep water. It is markedly gregarious at all seasons, but not noticeably social toward other seabirds.

History. In the following brief account, I have omitted mention of Puffins by a number of early writers who were not specific as to breeding localities.

Western and Eastern Egg Rocks in Muscongus Bay—Norton (1923b: 3) reported that the Puffin bred on these rocks prior to 1860, and that there were "considerable numbers" still on both rocks in the late 1870's. He pointed out that they were much reduced by shooting in the early 1880's, leaving only five or six pairs on Western Egg Rock by 1885. He saw birds and an egg that had been taken there that year. During the next two years, the last of the birds disappeared from the place. That they were "said to have laid eggs on Eastern Egg Rock in 1908" (Forbush, 1925: 32), was based on an ambiguous report by F. M. David (1909: 93). In a letter to Norton, written in April, 1909, David stated that, although Puffins came to the rocks in some numbers in early 1907 and 1908, none nested in these years. In 1938, Cruickshank (1938: 551) stated that he had not seen the Puffin in Muscongus Bay. Since then, he and others have seen it there on six occasions in summer. This area is only about 35 airline miles from the Matinicus Rock colony, and, since Puffins are known elsewhere to have a feeding range up to 70 miles (Wynne-Edwards, 1935: 336), these few occurrences do not indicate necessarily an attempt to re-occupy the Egg Rocks.

Big Green Island, off western Penobscot Bay—Puffins nested here prior to 1860 (Norton, 1923b: 3).

Matinicus Rock, outermost of the Matinicus group—The first lighthouse was erected on the rock in 1827. Norton (ibid. 4) suggested that Puffins probably were present at this time and were killed by the keepers for meat. A check of data in his files reveals no evidence of their presence, and, in fact, the only certain information is that the birds were absent from 1865 to 1875. Captain W. Grant (1887) wrote of protecting terns there in 1886, and mentioned that Puffins (he called them "rock birds") also occurred there. In 1896, a few were present (Norton, 1923b: 4). For 1897, Spinney reported five pairs nesting, and Knight (1899b: 35) reported "three or four" pairs. A male specimen in the Spinney collection was taken there on June 15 of that year.

In 1900, there were only two pairs (Dutcher, 1901: 92), and in 1902, a single pair, and in 1903, two pairs (Norton *in* Dutcher, 1904: 154). There were six birds in 1904 (Norton *in* Dutcher, 1905a: 91). Three or four pairs were present in 1906 (Tolman *in* Bowdish, 1909: 127), and, though Norton saw none himself in 1907, he received reports of one to five birds being present (Norton, 1907d: 319). Only two were seen in 1908 (Tolman *in* Bowdish, op. cit.). In a letter to Norton,

Tolman stated that four adults had been shot between 1904 and 1908. After 1910, "two or three pairs have been regular summer visitors" (Norton, 1923b: 4), but were not known to breed. An unstated number was seen in July, 1922, by E. H. Perkins. On July 26, 1930, Mr. R. Harding saw 45 adults; the light keeper later counted 66, and believed that 75 to 100 were present. Norton and R. P. Allen visited the rock on July 5, 1931, and were told that 50 to 70 adults were present. In 1934, over a dozen were seen in June or July (Chamberlain). On July 9, 1936, Norton saw nine birds but no indication of breeding. On July 24, 1937, I saw about 45 adults in sight at once, and the keeper said that about 80 had arrived in the spring; probably about 40 pairs were nesting. Cruickshank visited the rock the second week in July, 1939, and found a "small colony" present. On July 31, 1946, he saw about 70 birds, including many young being fed by adults, on the water in the vicinity of the rock.

Matinicus Seal Island, easternmost of the Matinicus group—From Norton's account (1923b: 3), we get the following picture. The island once was the main breeding place of the Puffin in Knox County. The birds were killed for food, and during the 1850's, parties used to visit this colony at evening and spread old herring nets over the rocks to capture the birds as they came forth in the morning. By 1886, the colony had been reduced to about 25 or 30 pairs. "Their final extermination was probably effected the following year by milliners' agents who carried on a most destructive season's work at that place."

Mt. Desert Island—"I am told by fishermen that the Puffin . . . used to breed on Mount Desert" (Packard, 1867: 256).

Machias Seal Island, off Cutler, Washington County—This island, formerly United States property, was expropriated by Canada (see p. 11). Two lighthouses were built in 1832, and maintained until 1905, when they were replaced by the present one. Pettingill (1939a: 348) stated that the keepers of the first lights disliked the Puffins and "proceeded to drive them away."

These birds were nesting on the island in 1877 or 1878 (Pearsall, 1879: 525). About 1883, Everett Smith found only 60 birds there (Norton *in* Dutcher, 1904: 160). About 1902, a "large number" nested (Seeley *in* Norton, 1903a: 14), and the keeper protected them. On August 2 of that year, the largest number seen by Norton at one time was 33, but the keeper estimated that 300 were present (Norton *in* Dutcher, 1904: 160). In 1911, Pearson (1911: 277) saw 74 birds, and was told that 300 were present, and F. A. Brown (1911: 241) saw 50 or 60 adults in early July. A photograph, taken by Brown, showing Puffins on the rocks, was printed in Bent (1919, opp. p. 89). These birds bred in some numbers in 1929 (S. Harvey). On June 24, 1931,

Norton saw "very few," but was told that the colony was thriving. For 1932 and 1935, Pettingill (1939a: 347) estimated 400 pairs each year. Norton saw considerable numbers in adjacent waters on August 27, 1936. The 1937 population was estimated at 500 pairs (Pettingill, ibid.). About 700 pairs were present in 1939 (W. R. Peabody), and the same number in 1940, according to the light keeper. There was a fairly sizeable breeding population in 1947 (O. Hawksley), but no estimate of numbers was made.

Remarks. The reduction, by shooting, of the population of this unwary bird began very early in the 1800's. Audubon (1835: 105), in referring to islands at the entrance of the Bay of Fundy, stated that, although many bred, perhaps there was not one bird "for a hundred that bred there twenty years ago."

It may be noted that an occasional pair bred in the Grand Manan archipelago, New Brunswick, in the early 1870's (Batty, 1874). Boardman was rather vague in stating (1862: 131) that a few bred "about the islands" at the mouth of the Bay of Fundy, *at* Grand Manan (*in* Knight, 1897d: 15), *on* Grand Manan (1903: 315), and *near* Grand Manan (*in* Knight, 1908b: 31).

Tufted Puffin

Lunda cirrhata (Pallas)

One specimen. "The specimen from which I drew the figure of this singular looking bird, was procured at the mouth of the Kennebeck, in Maine. It was shot by a fisherman gunner, while standing on some floating ice, in the winter of 1831–32" (Audubon, 1935: 364). The locality is in Sagadahoc County, and the drawing referred to is plate 249 in *Birds of America.*

Remarks. Although various persons, including T. M. Brewer (1875: 454) and Forbush (1925: 35), questioned this occurrence on the Atlantic coast, Norton (1926a: 91–92) pointed out that such doubts were unwarranted. A friend of Audubon's, J. P. Giraud, came into possession of a number of Audubon's specimens, and these formed part of the collection which Giraud gave to Vassar College. The Tufted Puffin specimen was in this collection (Orton, 1871: 717). I have examined this mounted specimen, which is in nuptial plumage as Audubon depicted it, and found the only data on it to be the words, "Audubon's type" written on the wooden base of the mount. I find no additional information in any museum catalogue at Vassar, other than the confirmation that the specimen was Audubon's. Since the specimen has the deciduous tufts and other characteristics of the

nuptial plumage, this might indicate that the bird was taken in late winter.

In addition to Audubon's statement, there is the report by Verrill (*in* Boardman, 1862: 132) that fishermen told Boardman that the "Tufted Puffin, or 'Sea Parrot' " was seen occasionally about the islands at the mouth of the Bay of Fundy in winter, also that a specimen in the Museum of Comparative Zoölogy "was probably obtained at Grand Manan." In regard to these statements, T. M. Brewer (1875: 454) wrote: "The references to Mr. Boardman as authority for the presence of this Pacific species on our coast, are founded in error. He has never met with it."

Family COLUMBIDAE

Pigeon; Rock Dove

Columba livia Gmelin

Introduced under domestication and now a nearly sedentary and *feral resident*, common to abundant in villages, towns, and cities.

Breeding. Displaying males often are seen in mid-winter and nest building frequently in mild weather in January and February. Although early attempts at breeding seldom succeed, Knight (1908b: 209) mentioned seeing birds incubating in December and February, and young in January, at Bangor. Successful nesting often begins by mid-March, although even then display, nest-building, and related activities may be halted temporarily by storms and periods of cold weather. Flimsily built nests of twigs, straw, or roots, are placed in lofts in barns, in cornices and other recesses of buildings, and, rarely, in large open cavities or forks in trees. The eggs (usually two) are incubated, beginning with the second egg, for about 18 days, and both sexes share in this duty as well as in brooding. For the first five or six days, the squabs are fed by regurgitation on a substance (pigeon's milk) formed by the sloughing off of cells lining the crops of both parents; later they are fed regurgitated grain and other foods. They are able to fly when about a month old. At least two broods, perhaps often three, are raised yearly.

Remarks. This Old World bird was introduced into Maine in a state of domestication at an unknown date. Escaped birds, or those not cared for, became feral, but they never have become adapted to living away from human habitations. They are known to have been feral and numerous in Portland since at least 1858, and very probably were so much earlier. The population may have decreased slightly in the past 20 years.

These birds eat street refuse, undigested grain in horse droppings, grain spilled about feed stores and railroad yards, feed put out for livestock and poultry, garbage at dumps (where they compete with English Sparrows, Starlings, and Herring Gulls), and such items as may be put out by bird-lovers. They do some damage by eating young plants in gardens and by pulling up sprouting oats and buckwheat, so that re-seeding sometimes is necessary, and when foraging in summer, they visit cultivated fields and pastures. Norton thought that those birds which frequent the tidal flats about Portland probably eat snails. Both English Sparrows and Starlings are somewhat parasitic on pigeons, following them about and snatching food from them.

Not only are some of their feeding habits detrimental to man's interests, but the birds are a nuisance about buildings where their droppings are unsightly. They spend much time "engaging in noisy fights and violent cooings at various hours, especially at early dawn when most of us would prefer a few hours more sleep" (Knight, 1908b: 208–209). I am not aware that their legal status has been settled definitely; they generally are considered 'wild' birds, that is, not privately owned, and, as an unprotected species, may be destroyed if they do damage to private property.

On the night of January 4, 1922, in Portland, an ice storm injured numerous pigeons by freezing their feet to perches and icing their plumage. Many persons cared for injured birds picked up the next day.

Eastern Mourning Dove

Zenaidura macroura carolinensis (Linnaeus)

Summer resident, rather common in York, Cumberland, southern Androscoggin, and western Sagadahoc Counties, and in diminishing numbers eastward to rare in eastern Hancock and Washington and in most of the northern half of the state; *winter resident*, uncommon but regular in York, Cumberland, and western Sagadahoc Counties. Possibly some may be resident.

Spring. Most migrating birds are seen during the last two thirds of April, although some records for the last ten days of March may be for birds that have not wintered in the state. Two were seen as early as April 2, 1945, at Schoodic Point, Hancock County (Weston), and there are several late April dates for that county. This species was noted on April 26, 1939, at Presque Isle (Chamberlain).

Fall. In August, after most of the young are fledged, several families often join to feed in fields. There is some wandering by such flocks, but the southward movement occurs from September into November

(mainly in October). Late records for birds seen outside the known winter range are: one or two on November 1, 1922, at Machias, Washington County (Kilburn, 1923: 37); two on November 14, 1944, at Brewer (Weston); unstated number on November 15, 1924, at Dover-Foxcroft, Piscataquis County (M. Hodgdon); and one on November 23, 1945, at Hampden, Penobscot County (Mrs. P. Hannemann).

Breeding. The nest is a frail platform of twigs and straws, placed in a wide variety of situations, such as in small or large coniferous or deciduous trees, mattings of vines, or even on window ledges, the latter site having been noted outside of Maine. There is great variation in height above ground, but typically the nest is from 10 to 25 feet. The first Maine nest, reported by Miller and Griscom (1920), was found on June 8, 1919, at Eliot, York County, and the young had left before this date. A pair nested at Cumberland, Cumberland County, for "many years" prior to 1924 (Norton), but data are lacking. A pair started building on May 8, 1945, at Auburn, Androscoggin County, and young from this nest were flying by June 29 (D. Norton). In 1929, I observed a pair at Brunswick, Cumberland County, and, although I was unable to locate the nest, I collected two young, recently out of the nest, in July. Two eggs usually make a clutch. Outside of Maine, the incubation period has been reported variably, but probably is 14 or 15 days in most instances, and the fledging period is, perhaps, usually 13 to 15. Probably two broods are raised yearly in Maine.

Winter. At this season, three or four birds usually are found together, although occasionally a single bird has been reported. They have been seen in stubble fields, on marshes and beaches, and in barnyards.

The first recorded winter occurrence was for January 4, 1910, at Pownal, Cumberland County (Mead, 1910b). In 1920, one was seen from January 12 on, at Lewiston, Androscoggin County (C. E. Miller). One wintered in 1923–24 in Portland, and several in the early 1930's at Cape Elizabeth (Norton). Reports indicate a small winter population since that time. The most easterly records are for three birds in 1944–45 at Topsham (Gross), and for winter occurrence since 1945 at Swan Island, Richmond (S. Powell), both localities being in Sagadahoc County.

Ecology. Not much is known about habitat preference in Maine, except that in southwestern counties, there seem to be more birds in rather dry and sandy areas, as near the coast west of Portland, and about Freeport and Brunswick in eastern Cumberland County. The species is markedly gregarious in fall and winter.

Remarks. After discussing the Passenger Pigeons, Josselyn (1674;

1865b: 79) stated: "Ring-*Doves* they say are there [at Scarborough] too, but I could never see any." This hearsay report probably referred to the Mourning Dove.

At the time this species was listed for Maine by Williamson (1832: 141), it probably was rather rare, even in southwestern counties. Verrill (1862b: 157) was the first to suggest that the species probably bred in southern Maine. By the early 1880's, it was not unusual to see three or four of these birds in a day at Saco, York County (J. L. Goodale), yet Smith (1882–83: 26) considered them "rare" in the state. By the early 1920's, the species was common in York and Cumberland Counties, and, by 1930, flocks of 35 to 50 were seen occasionally in August. The population continues to increase slowly, and the bird is extending its breeding range in the state.

Passenger Pigeon

Ectopistes migratorius (Linnaeus)

Extinct. Former summer resident and transient, abundant as late as 1817, and numerous enough to provide good netting and shooting until the early 1850's.

Remarks. Champlain saw Passenger Pigeons, on islands near Cape Porpoise, York County, on July 12, 1604, as mentioned in the account of his voyage of that year. The next important mention of these birds was that of Josselyn, who lived in what is now Scarborough, from early July, 1638 to October 10, 1639, and again from early August, 1663 to August 28, 1671. In his *Two Voyages* (1674; 1865b: 79), he wrote: "The *Pidgeon*, of which there are millions of millions, I have seen a flight of *Pidgeons* in the spring, and at Michaelmas when they return back to the Southward for four or five miles, that to my thinking had neither beginning nor ending, length nor breadth, and so thick that I could see no Sun, they joyn Nest to Nest, and Tree to Tree by their Nests many miles together in *Pine*-Trees. But of late they are much diminished, the *English* taking them with Nets. I have bought at *Boston* a dozen *Pidgeons* ready pull'd and garbidged for three pence." [*Note:* Champlain came from a country that had adopted the Gregorian calendar before the time of his voyage; Josselyn undoubtedly was on the old style, since England did not change until 1750. The difference, of 11 days between the two calendars, would make Josselyn's Michaelmas fall on September 18.]

There are at hand records of occurrence of the Passenger Pigeon at about 60 different Maine localities, but there are very few data on life history. The spring migration probably occurred in April. Mead

(1910a: 1) recorded, in his notes for April 24, 1877, that the species was common at North Bridgton, Cumberland County. There were "immense flocks," on April 30, 1817, at Warren, Knox County (C. Eaton, 1851: 304). In August, at the end of the breeding season, great flocks wandered about in search of food. When an unusual number stayed in one locality for any length of time, and many were shot, in local tradition, that became known as a 'pigeon year.' Fall migration occurred chiefly in September, and into early October, the latest definite record at hand being for a bird of the year, seen by N. C. Brown at Portland, on October 8, 1872.

Nesting probably began in May, one or two eggs making a clutch, and two broods probably were raised yearly. Mead (op. cit.) reported a few pairs breeding in 1877, and, for the same year, Batchelder (1882: 151) reported them as breeding, "but not common," at Grand Falls in Canada, some 20 miles from Fort Fairfield, Aroostook County. There is some evidence that, in 1879, more were seen in Maine than for some time previously, or probably ever after. Hardy (1881) wrote that the "thousands" of former times had dwindled to the point where it was difficult to get specimens for collectors. In the following year, N. C. Brown (1882f: 23) stated that this bird occurred in the Portland region chiefly as a "rare autumnal visitor, first appearing in the latter part of August," and that it possibly bred occasionally, "scant evidence of which exists in the occurrence of full-grown young, late in June."

The last generally accepted record of this species in Maine is for a bird taken at Dexter, Penobscot County, and reported by Knight (1896g), the date being August 16, 1896 (Knight, 1897d: 56). Later, Knight (1908a: 54) wrote: "Mr. Harry Merrill, of Bangor, recently informed me that in the early summer of 1904 he saw a female Passenger Pigeon at Baxter's taxidermist shop in Bangor. The bird had recently been mounted and had the wrappings still on it when first seen by Mr. Merrill. Mr. Baxter stated that it had been sent him from Bar Harbor in the flesh. The condition of the bird when seen by Mr. Merrill was such as to make certain that it had been recently killed." Some writers have considered this a questionable report, but Merrill, a competent ornithologist, had no doubts about it. Before me is an undated clipping of an advertisement, which he inserted in a Maine newspaper about 1910 or 1911, at a time when collectors were eager to get specimens. It reads: "A few years ago a PASSENGER PIGEON was sent from BAR HARBOR to be mounted by a Bangor taxidermist. Can any one tell me who shot it, or who owns it at present? Write HARRY MERRILL, Bangor, Maine." I am not aware that the bird in question ever was located.

Family CUCULIDAE

Eastern Yellow-billed Cuckoo

Coccyzus americanus americanus (Linnaeus)

Summer resident, rare in York, Cumberland, and southern Androscoggin Counties, and rare visitant in Oxford and in the remaining coastal counties.

Spring. Although Knight (1908b: 266) stated that this species arrives "about May 18," records at hand, except one, begin in early June. According to Norton, the bird reported as taken by E. Gordon at Bar Harbor, Mt. Desert Island (Smith *in* Knight, ibid.), was entered in Smith's journal as having been collected on April 15, 1884.

Fall. Although there are more records of occurrence for August than for any other month, it is likely that migration takes place mainly in September. A late date is for a specimen, examined by Norton, taken on October 4, 1900, at North Bridgton, Cumberland County.

Breeding. This species is said to build a poorly constructed platform for a nest, usually about four to eight feet above ground, in a thick growth of deciduous bushes or vines, and usually to lay three or four eggs. In addition to the several reports lacking data, there is a record, by Goodale (1893), of two eggs taken on unstated date in 1892 at or near Saco, York County. According to Bent (1940: 57), the incubation period is said to be about 14 days. The fledging period apparently is unrecorded. A "juvenal" was seen on August 15, 1935, on Appledore Island [one of the Maine islands], in the Isles of Shoals (P. L. Wright, 1937a: 32). One brood is raised yearly.

Ecology. There are no Maine data, other than for occurrence in deciduous trees and thickets.

Remarks. Although Boardman first (1862: 123) reported this bird as common and breeding in the Calais region, he soon altered this (*in* Samuels, 1867: 83) to "extremely rare."

Certain, though not all, of the sight records by W. H. Brownson, published in the migration reports of the *Journal of the Maine Ornithological Society,* were considered questionable by Norton.

Black-billed Cuckoo

Coccyzus erythropthalmus (Wilson)

Summer resident, varying in different years from rather rare to fairly common, northward to about the latitude of central Penobscot County,

and decreasing to rather rare (perhaps absent in some years) in most of Aroostook; *transient*, in spring and fall in small numbers.

Spring. This cuckoo generally arrives in southwestern counties about May 12, and at Bangor about May 18 to 20, although in some years it may not be noted until a week later than these dates. Early dates for birds seen are: one from May 6 on, 1945, at Hallowell, Kennebec County (Mrs. A. L. Grover); May 8, 1938, at Lewiston, Androscoggin County (P. A. Wright); and on May 11, in 1905 at Hebron, Oxford County (Johnson *in* Sweet, 1906b: 36), and in 1906 at Saco, York County (Abbott *in* Brownson, 1907c: 38). The earliest date for Presque Isle, where this species seldom is seen, is May 30, 1945 (Chamberlain). Migration continues into early June, even in southwestern counties.

Fall. There is much premigration wandering, but the southward movement does not begin until the last week in August, being most noticeable in the first 25 days of September. The species occasionally has been seen as late as October 16 in southern Penobscot County and more southerly points, and there are these later dates for single birds seen: October 22, 1945, at Schoodic Point, Hancock County (H. P. Hinckley); October 24, 1942, in Portland (Mrs. J. R. Brown); and October 27, 1930, at Cumberland, Cumberland County (Rich).

Breeding. All Maine data on nests show that they are slightly cupped platforms of twigs, and, with the exception of two, fairly well lined with fine material. The situations were in deciduous bushes, tangles of raspberry or blackberry vines, and in small trees, only one being over five feet from the ground. Knight (1908b: 268–269) observed both birds of a pair nest-building and, after the first egg was laid, incubating. The few records at hand are for clutches of two and three eggs. First clutches are laid during the first three weeks in June. "The eggs are laid at intervals of two or three days, or sometimes at greater intervals, so that well grown young are sometimes found with unhatched eggs which are afterward hatched" (ibid. 268). An early record is for May 24, 1896, when Norton found one egg in a nest at Westbrook, Cumberland County.

In Michigan, O. R. Spencer (1943) found incubation to be 10 and 11 days, and the young to leave the nest in six or seven. In Ohio, F. Herrick (1935: 97) reported that, at seven to nine days of age, the young, with half the feathers sheathed, leave the nest and enter a climbing stage which lasts about a fortnight or until they can fly. They are fed by regurgitation. Probably two broods are raised, at least occasionally, in Maine. Brewster (1937: 409) saw a pair copulating on July 15, 1908, at Bethel, Oxford County. Knight (1909c: 122) recorded a nest with two eggs partly incubated on August 21, 1909,

at Glenburn, Penobscot County. Ritchie (1882) reported two small young still in the nest on September 5, of unstated year, at "White's Corner."

Ecology. Whereas the low thickets these birds resort to for nesting occur on both high and low ground throughout the state, preferred sites in southwestern Maine seem to be those in the drier situations. In more northerly and easterly areas, however, nests perhaps are built more often in growth on low ground, as in alders along watercourses, in various types of bushes in wet places in fields and pastures, or in rapidly growing second growth about the edges of woodlots where the proper stage of density is a very brief and transitory one. In summer, this bird usually can be expected to occur in those hardwoods in which tent caterpillars have hatched. Outside the breeding season, the species quite often is seen high up in mature trees in patches of deciduous or mixed growth, but not in extensive areas of unbroken forest. It is neither gregarious nor social at any season.

Remarks. The fluctuations of this bird have been noted for a long time, though seldom recorded. It was scarce in Maine in 1903 (Brownson, 1903: 43), but by 1906, was more common than for several seasons (Brownson, 1906e: 86). Sweet (1908: 88) reported that, after having been "comparatively rare" for several previous seasons, this cuckoo was very common in 1908 in Franklin County. Numbers were fairly high for several years about 1928 to 1931, and decreased thereafter, with an upward trend in 1938 and 1939. In 1940, Eckstorm saw only one cuckoo at Brewer, this being on August 9. There came an upward trend in the years following, but in 1946 a decline became apparent, it being more marked in 1947. These changes, which usually seem to be at least statewide, probably will prove to be related in some way to fluctuations in food supply.

"They eat almost every kind of moth, butterfly and larvae thereof, beetles, grasshoppers, crickets, and occasionally various berries and soft fruits. I have known of their eating numbers of potato bug larvae" (Knight, 1908b: 268).

An interesting record of occurrence is for a bird seen by Oscar Hawksley, July 3, 1947, on offshore Machias Seal Island (Canadian territory). The species has nested on Monhegan (Warner Taylor).

Although Josselyn (1672; 1865a: 47) stated that there were no cuckoos in New England, this must not be taken as evidence that these birds were not present, for he, familiar with the voice of the European species, would not have identified as a cuckoo's the dissimilar voice of ours.

Family TYTONIDAE

North American Barn Owl

Tyto alba pratincola (Bonaparte)

Perhaps a very rare resident, although of *six records*, five are for late fall or winter.

Records. About 1900, a pair inhabited an old barn at Great Head on Mt. Desert Island, according to Mr. H. Fillicttaz of Bar Harbor (Bond). A male was shot on October 4, 1923, at Biddeford, York County (Norton, 1933b). On October 26, 1927, one flew into a garage in Portland, and died in captivity the following day (Haven, 1927). A male was taken a day or two before December 12, 1927, at Mosher's Island, in the town of Cumberland, Cumberland County (Norton, 1933b). A female was shot on December 15, 1939, two miles east of Lincoln, Penobscot County, and brought to Walter Clayton of Lincoln, to be mounted (A. E. Brower). A male was collected on December 8, 1945, at Falmouth, Cumberland County (Haven).

Remarks. The bird taken near Lincoln had eaten two Meadow Mice (Mendall, 1944: 207).

This species was included in the Maine fauna as early as 1862 by Hitchcock (1862: 66), and in 1877 by N. C. Brown (1877: 28). Later, however, Brown (1882a) showed that both citations were based on unreliable data.

See p. 314 for comment on another species locally called Barn Owl.

Family STRIGIDAE

Eastern Screech Owl

Otus asio naevius (Gmelin)

Resident, very rare but probably breeding in southern Oxford, Franklin, and Androscoggin Counties and in coastal counties eastward into Hancock, and very rare *visitant* elsewhere throughout. No certain records for about a decade.

Breeding. There are several reports, but the nearest to specific data, was mention by Carpenter (1886b: 177) of a "set" of eggs taken "from a decayed apple tree in New Vineyard," Franklin County, on unstated date. Outside of Maine, this subspecies is reported to lay three to seven (usually four or five) eggs, usually in cavities in trees. The incubation is reported variably as 21 to 30 days, probably being about 26, and the young are fledged in five to six weeks. One brood is raised yearly.

Ecology. The scant data for Maine indicate that this owl shows a preference for oak woods and apple orchards, usually near water.

Remarks. The probable breeding range, as I have given it, is less in extent than was given by Knight (1908b: 259). Outside of this range, as stated above, most captures have been in winter, perhaps indicating some wandering at that season.

Of two birds taken in winter in the vicinity of Lincoln, Penobscot County, one had eaten a mouse and a passerine bird, the other an English Sparrow (Mendall, 1944: 206).

As Knight (op. cit.) stated, both red and gray phases occur in Maine, although most birds are of the latter type.

Taber (1945: 368) reported hearing an owl of this species on September 2, 1939, at Frost Pond in Township 2, Range 11, Piscataquis County. This was cited by Palmer and Taber (1946: 305), but I now consider it injudicious to have recorded this species for northern Maine on the basis of this report, for not only is the call of this owl very similar to that of Richardson's Owl, but also the type of habitat is where one would expect to find the latter bird.

Arctic Horned Owl

Bubo virginianus wapacuthu (Gmelin)

Incursion visitant, six possible records.

Records. In the collection of the Portland Society of Natural History is a specimen believed to have been captured near Portland, and which was given alive to the Society on December 6, 1869 (Norton, 1897b: 103). Carpenter (1886b: 177) stated of horned owls in the Dead River region [probably the Franklin County part]: "Its hootings were heard every night in June . . . and several specimens were secured, one of which was in exceedingly light plumage, almost savoring of albinism." Kilburn (1923: 38) described a specimen, taken in Aroostook County in the winter of 1922–23, as "abnormally pale, the black being replaced by gray and the tawny by white or pale gray. Its legs and feet are white and unmarked. Its plumage is thicker and softer than that of the ordinary typical owls." Norton examined and referred to this subspecies, the following: a very large and pale mounted specimen that had been collected near Portland in winter, prior to 1927, and in the collection of F. Wendell; a bird, received in the flesh by a Portland taxidermist on December 23, 1927, from A. H. McGlaughlin of Yarmouth, Cumberland County, that had much white in the plumage and the feet unspotted; and a specimen, received from Scarborough by the same taxidermist on December 17, 1936, that had

much white in the plumage, though a barred pattern was plainly evident dorsally and ventrally, and toes unspotted but with inner surfaces of the tarsi having dusky spots.

Remarks. The 1886 record by Nash (*in* Knight, 1897d: 69) was later withdrawn by Knight (1908b: 651).

There was an Arctic Horned Owl incursion, the winter of 1918–19, in New York and New England, and, although I find no data, this probably included Maine. On comparing dates of occurrence with incursion periods listed under typical *virginianus* below it will be noted that, during some incursions, more than one subspecies has been present.

Labrador Horned Owl

Bubo virginianus heterocnemis (Oberholser)

Incursion visitant, four possible records. On March 12, 1870, a "fresh specimen" was given to B. F. Fogg, and, although the locality was recorded only as "Maine," it was believed to have been taken near Portland (Norton, 1897b: 103). One was taken in the fall of 1917, at Cape Porpoise, York County, the skin being in Norton's collection in the Portland Society of Natural History. Another was taken about February 17, 1918, at Scarborough (G. M. Allen, 1919: 367–368). Kilburn (1923: 38) wrote that Horned Owls were unusually numerous in Aroostook County in the winter of 1922–23, and that of several specimens secured, one "is extremely dark, the black predominating and all gray replaced by tawny. It answers perfectly descriptions of the Dusky or Labrador Horned Owl."

Remarks. Two of these specimens were reported originally under the subspecific name *saturatus.*

On comparing the above dates of occurrence with incursion periods listed under typical *virginianus* below it will be noted that, during some incursions, more than one subspecies has been present.

Eastern Horned Owl

Bubo virginianus virginianus (Gmelin)

Resident, fairly common, especially in coniferous forested areas, on the mainland and on a few islands; subject to *incursions.*

Incursions. Increased numbers would seem to indicate marked incursions during the following winters: *1908–09* (Clark, 1909b); *1917–18* and *1918–19* in New England (G. M. Allen, 1919: 368), with Maine data at hand for the first of these, but only uncertain indications

for the second; *1922–23* (Kilburn, 1923: 38); and *1926–27* and *1937–38* (Norton). In the last instance, birds were especially numerous on coastal islands. On comparing dates of occurrence of the two preceding subspecies, it will be noted that, during some incursions, more than one subspecies occurred.

Breeding. This owl lays its eggs in the old nests of crows, hawks, eagles, and squirrels, usually high above the ground and, perhaps, most often in coniferous trees. Knight (1908b: 262–263) stated that a large hollow stub is used rarely as a nesting site. Apparently the owl adds little or no material to these structures. Norton (1928a: 16) reported that a pair, "on finding their last year's nest [believed to have been originally a Crow's] wrecked, though showing attachment to it, moved to another quarter rather than repair it, or build a nest where it had been."

Maine records at hand are for two, and one of three, eggs. Probably most eggs are laid during the first three weeks of March. A female, killed on February 23, 1930, on a Casco Bay island, contained an egg which would have been laid within a day (Norton). A late date for "nearly fresh" eggs is March 23, in Oxford County (Carpenter, 1884a: 9). Eckstorm collected two slightly incubated eggs on April 29, 1939, at Holden, Penobscot County, but this undoubtedly was a second laying, three eggs having been taken on March 31 from the same nest. Outside the state, the incubation period, according to Bent (1938: 304) has been reported variably as 26 to 30 days (but needs checking), and the young may leave the nest when four or five weeks old, being able to fly when nine or ten weeks of age. They are fed by the parents for a long period thereafter. One brood is raised yearly.

Ecology. This is a crepuscular and nocturnal owl, most often found in extensive areas of woodland, and showing some preference for stands of mature conifers on uplands.

Remarks. Mendall (1944: 202) reported on 79 stomachs containing food, mostly of birds taken in the vicinity of Lincoln, Penobscot County, and with good seasonal distribution. Items occurred in numbers of stomachs as follows: Snowshoe Hares in 40; mice (mostly Meadow and Red-backed) in 12; poultry or game birds in 10 (Ruffed Grouse in 4 and Wood Ducks in 2); Squirrels (equally Red and Flying) in 8; Muskrats in 6; Porcupines in 4; song birds in 2; and moles and shrews in 2. A Skunk, a Woodchuck, and a House Rat were represented in one stomach each, and there were insects and vegetable matter each in 3. Two of 7 empty stomachs bore Porcupine quills. In three of six cases noted, quills had pierced internal organs and the birds were emaciated, but two apparently had eaten Porcupine without serious consequences.

Norton (1928a: 11) reported that he had found evidence of a family of these owls having eaten a Red-tailed Hawk.

For detailed discussions of the voice of this bird, the reader is referred to Brewster (1925: 396–397) and Norton (1928a). A scene rarely observed, was reported by Hardy (1910a: 768) as follows: "Their courtship in March is a most ludicrous performance. Two will get on one bare limb and bow and scrape and sidle up to each other, each making the most ridiculous noises, which probably are intended for terms of endearment, but which sound more like what we imagine devils might make if laughing."

Snowy Owl

Nyctea scandiaca Linnaeus

In *incursion* years, this owl is *transient*, *winter visitant*, and *winter resident*, varying greatly in numbers, and in other than incursion years a few generally occur.

Migrations. Although this owl usually may be expected after the middle of November, it is present rarely by the second week in October, and sometimes delayed until December or January. Earlier dates almost always have occurred in incursion years. The following records, from Gross (1947h: 593), are the earliest for the state, and are part of the 1945–46 incursion: one taken on September 15, 1945, at Kezar Falls in Parsonfield, York County; one seen on September 29 at Stratton in Eustis, Franklin County; one on October 1 at Mt. Desert Rock lighthouse; one received on October 3 by a taxidermist at Hallowell, Kennebec County; and on October 10, a female shot at Caribou and one at Blaine, both in Aroostook County. Another October 10 record for Caribou was in 1941 (W. Clayton). Other early records include: one received on October 12, 1934, at a taxidermy shop in Portland (Haven); one taken on October 14, 1926, at Bangor (Gross, 1927: 489); and one taken on or before October 15, 1941, at Presque Isle (Chamberlain).

For spring, the data indicate that, in incursion years, healthy birds have been seen as late as March 24 or even April 1. Perhaps almost all of the numerous April records at hand are for injured or enfeebled birds. One was seen as late as May 14, 1946, at Portland (Gross, 1947h: 593); one was reported to Norton as seen in "late May," 1936, at Van Buren, Aroostook County; and Boardman (1862: 123) reported a "pair" near Calais the "last of May," and suggested that they were nesting.

Incursions. Space is lacking for a discussion of the known relationship between rodent population fluctuations in the north and incursions

of this owl. As regards Maine, the following facts should be noted. The larger flights come 'with a rush' in late fall, and birds tend to follow the coastline where they concentrate on islands and the mainland. In the lesser flights, however, the birds appear later, and are more evenly distributed throughout. Although a widespread scarcity of food causes the larger flights, a small flight may be the result, apparently, of either (a) a slow recovery of rodent populations in the north, indicating a continued food shortage, or (b) a local decline in the rodent population. I have listed below all recorded Snowy Owl incursions, indicating the relation of each to Maine. In a number of early instances where incursions were reported farther westward, a search of New England newspapers perhaps would reveal that these flights also encompassed this region. In several cases, the list below is at variance with Gross' recent (1947h) paper on the subject, or provides added information. The reader should compare incursion periods with those for other owls, also for hawks and the Northern Shrike.

1833–34. No Maine data; incursion recorded for Ontario region by W. H. (cited in Gross, 1947h: 585).

1836–37. Several shot at Warren, Knox County (C. Eaton, 1851: 340). That several were taken in this area near the coast would seem to indicate an incursion.

1837–38. As in 1833–34.

1839–40. As in 1833–34.

1843–44. A great many in the vicinity of Philadelphia and in New Jersey and Delaware (Cassin, 1844), so almost certainly, many in New England. This flight not listed by Gross.

1853–54. As in 1833–34.

1862–63. November 14 to December 16, Boardman (1907: 95) shot three; several shot near Salem, Massachusetts (Wheatland, 1862); marked flight in Ontario (W. H., cited in Gross, 1947h: 585). Probably a flight of fair size throughout New England.

1866–67. Sizeable flight throughout New England, parts of Canada, and elsewhere, recorded by Deane (1877: 11 and 1902: 275).

1876–77. Large flight, mainly of dark-plumaged, lean birds (Deane, 1877), extending farther southward and to the middle west (authors cited in Gross, 1947h: 586).

1878–79. "During the month of November, 1878, I saw quite a number of specimens while visiting some islands and ledges on the eastern portion of the coast of Maine" (Smith, 1882–83: 6). This flight not listed by Gross.

1882–83. Sizeable flight in Maine (Bowler, 1883; Hardy's personal notes) and into Connecticut (Wade, 1883), and elsewhere (various authors in Gross, 1947h: 586).

1886–87. Authors in Gross (ibid.) recorded a flight for Massachusetts and farther westward; no Maine data, and I doubt that it extended this far east.

1889–90. Large flight, beginning in November. Recorded for Maine by W. D. U. (1889) and Webster (1890a), but authors cited in Gross (1947h: 586) indicated greater numbers throughout a very large part of the middle west.

1890–91. A moderate flight reached the Maine coast (E. W. L., 1890; C. H. G., 1891; D., 1891), and extended south to Delaware (Foster, 1891). Not listed by Gross.

1892–93. A very large incursion in Maine (Spinney, 1898: 21; Deane, 1902: 275), which extended to north central states, according to authors in Gross (1947h: 586–587).

1896–97. Gross (ibid.) cited authors who reported an incursion in British Columbia and Washington, but, he stated, it was "not pronounced" in the eastern United States. I have no data indicating a flight in Maine for that season.

1901–02. A very large flight, mainly of light-colored birds, which came late, the birds being in good physical condition (Deane, 1902). Knight (1908b: 263) estimated that about 125 of these birds were sent to Maine taxidermists. Gross cited these, and also other authors, showing that the flight extended west into Ontario and south to central United States.

1905–06. A large incursion, extending at least to the middle west, as shown by various authors cited in Gross (1947h: 587). His citations of Deane, Knight, Spinney, and Brownson, apply to this flight in Maine, but his Swain citation referred to a few birds in Maine the preceding winter. Rowe (1905) stated that, in Maine, the birds began to appear by November 25.

1909–10. Gross (1947h: 587) stated that a more westerly incursion was not as marked "in New England." I have no data for Maine.

1912–13. A small flight coastwise in Maine (Norton). Gross (ibid.) cited Hicks' report of many taken in Ohio, and added that "this year was not marked by an unusual invasion . . . into New England."

1917–18. After early January, there were more birds in Maine than in years of no noticeable flight (Norton). This agrees with Gross (ibid. 588) for New England, and for the reports of greater numbers farther westward in 1917–18.

1921–22. Marked flight in the middle west, and many individual records in the east, according to Gross (ibid.). I have no corroborative data for Maine.

1922–23. Noticeable flight in December, being well inland in Maine rather than coastwise (Norton).

1926–27. One of the largest known incursions, birds occurring in Maine from October until well into March or later, with peak numbers in mid-November, mainly coastwise. This flight was noted from Newfoundland to North Dakota, and southward to North Carolina (Gross, 1927: 487–488).

1930–31. A flight came early, but did not build up to such proportions as the preceding one, being about three-fifths as large, and greatest concentration west of New England (Gross, 1931 and 1947h: 588).

1932–33. Noticeable flight in Maine, arriving early in December, coastwise (Norton). Not listed by Gross.

1933–34. Noticeable flight in Maine, especially from November 20 through December, coastwise (Norton). Not listed by Gross.

1934–35. An incursion, about two-fifths as large as in 1926–27, with concentration of birds mainly in Quebec and New England (Gross, 1935 and 1947h: 588).

1937–38. A flight in Maine about two-fifths as large as in 1926–27 (Gross, 1947h: 588).

1941–42. A flight in Maine about half as large as in 1926–27 (ibid.), arriving from very early in November through December, and rather well distributed inland as well as on the coast (Norton). This flight has been mapped in detail by Snyder (1943: 10).

1945–46. A flight seemingly larger than that of 1926–27, but more thorough reporting of it may have accounted for this (Gross, 1947h: 589). More birds came to Maine early than in any other recorded incursion, and arrivals apparently continued to at least the end of December or later. This flight was mapped carefully (*in* Snyder, 1947: 76), showing concentration areas to have extended from Newfoundland to Lake Superior, and the flight noticeable clear to the Pacific coast.

Ecology. This owl, which is chiefly diurnal, is found in open places. Usually it perches on the ground or on hummocks in fields, on haystacks in marshes, or in almost any treeless spot, even including rocks close to the water on islands when the tide is low. Although the species is solitary in winter, several birds may be found on the same small island during an incursion.

Remarks. In Acadia National Park's mimeographed *Nature Notes from Acadia* (vol. 2, no. 5, pp. 1–4, Nov.–Dec., 1933), there appeared an article on Snowy Owls by Arthur Stupka. Among data included was a partial list by Norton of incursions in Maine from 1867 to 1934, material from two of Gross' papers, and data on stomach contents from Walter Clayton of Lincoln. Most of this article, including the list of incursions, later was printed verbatim (Anonymous, 1934), but has been overlooked or not cited by subsequent authors.

For details of the food habits of this owl, the reader is referred to Gross (1944a) and Mendall (1944: 203–204). The latter had access to the original data of Clayton. These authors show that, usually, there is little justification for killing this handsome owl on grounds of alleged damage to native game. The House Rat is one of its chief food items when in Maine.

Reports of this owl nesting in Maine began with Audubon and are, of course, erroneous.

American Hawk Owl

Surnia ulula caparoch (Müller)

In *incursion* years, a *transient* and *winter visitant*, in varying numbers and noted chiefly early in winter, a few probably lingering until *early spring*, and, in other than incursion years, apparently often absent. Believed to have bred formerly.

Migrations. This species usually is seen first about October 24. Earlier dates are for one shot on September 14, 1870, at Norway, Oxford County (A. E. Verrill, 1871), and one taken on unstated September date at Asticou on Mt. Desert Island (Tyson and Bond, 1941: 62). One was taken on October 12, 1889, in the New Hampshire part of the Umbagog region (Brewster, 1925: 399–400). More are seen in November than in any other month, the few reported later being mainly for early January. Although Knight (1908b: 265) stated that the last birds leave by March 10, the only specific spring record I have at hand is for a bird taken on April 16, 1906, at Van Buren, Aroostook County, recorded by G. M. Allen (1908a: 235).

Incursions. The size of some incursions was indicated by Knight's statement (1908b: 264–265) that, during some seasons, this bird occurred "in comparatively large numbers, as many as forty being taken throughout the State." In *1867*, an incursion is indicated by the report of J. A. Allen (1870: 569) that five birds were taken in the autumn near Westfield, Massachusetts. In *1884*, from late October nearly through November, there was a marked flight, and E. S. Bowler, Bangor taxidermist, received 28 birds in the course of a few weeks (Brewster, 1885a). In *1902*, there was a small flight in the fall (Norton) In late *1913*, possibly there was a small flight, for C. H. Clark of Lubec, Washington County, received two specimens and reports of several birds seen in that vicinity. In *1925*, Walter Clayton, taxidermist at Lincoln, Penobscot County, received a total of eight birds from October through December, indicating a flight (Mendall, 1944: 204). In late *1934*, there was an unusual number of these birds in Quebec, according to Dr. D. A. Déry (*in* Gross, 1935), but I have no evidence

that any numbers reached Maine, though one was seen by A. Stupka at Mt. Desert Island on October 26.

Winter. I have no records of occurrence after January, except the report and one record already cited under Migrations, but Knight (1908b: 265) probably was correct in implying occurrence all winter—at least in flight years.

Ecology. The following description of habits and habitat, applicable to Maine also, is from Dresser's experience with this diurnal owl in New Brunswick, as given in Baird, Brewer, and Ridgway (1874, 3: 79): "It was often seen by him hawking after prey in the strongest sunshine, or seated quietly blinking on the top of an old blasted tree, apparently undisturbed by the glare of the sun. In its general appearance, and particularly in its flight, it appeared to him to have considerable affinity to the Sparrow Hawk. In New Brunswick it affected the open plains or so-called blueberry barrens, where the open country is covered with low bushes and an occasional scathed tree. It would sit on one of these trees for hours in an upright hawk-like position, occasionally hunting over the ground, like the Kestrel of Europe, in search of small field-mice. It showed but little fear, and could be easily approached within gun-shot. When shot at and missed, it would take a short flight and return to its former perch."

A very shrike-like and characteristic habit of this owl is that of swooping nearly to the ground after leaving its perch, then gradually swinging upward again to a point of vantage.

Remarks. Reports of this owl breeding in Maine, by several early writers, are based on Boardman. For the vicinity of Calais, he stated (1862: 123): "Resident. Not very plenty. Breeds." In a letter to Baird, dated January 4, 1865, he wrote (*in* Boardman, 1903: 195): "We also find stragglers from the north in summer, but are so uncommon [they] are hardly worth mentioning, such as Hawk Owl, . ." Samuels (1867: 80) wrote: "My friend, George A. Boardman of Milltown [a hamlet in Calais], Me., has been so fortunate as to find its nest, with eggs, in that neighborhood." A few years later, in Baird, Brewer, and Ridgway (1874, 3: 77), it was stated that "Mr. Boardman gives this species as resident, though rare, in the neighborhood of Calais, being occasionally found there in the breeding-season." It is known that Boardman had eggs of the Hawk Owl, and that he presented two to the U. S. National Museum. Bendire (1892: 393) wrote that, according to Boardman, this species was a "rare resident in the vicinity of Calais, Maine," and that the eggs given to the Museum were "said to have been obtained on the shores of the Gulf of St. Lawrence in the spring of 1861."

The above would seem to add up to the finding of perhaps a single

nest in eastern Washington County or adjacent New Brunswick, and eggs from more distant points. Harlow (1944) mentioned a young bird, in the Museum of Comparative Zoölogy, that was taken on August 10, 1878, near St. John, New Brunswick. He also stated the species was considered, by Allan Moses, an occasional summer resident on Grand Manan, and that, on June 6, 1925, he himself found a nest, in a dead spruce within five miles of Tabustinac, Northumberland County, New Brunswick, that contained six nearly fledged young when examined the next day.

Reporting on 20 Hawk Owl stomachs containing food, the birds having been taken from October to January, perhaps all within 25 miles of Lincoln, Mendall (1944: 204) wrote: "All had fed upon mice; except for two which in addition had taken one shrew apiece, no other food items were present. Meadow mice were identified most frequently and also a number of red-backed mice."

A male specimen, taken in Houlton, Aroostook County, in the winter of 1876–77, was referred to the typical subspecies *ulula* of the Old World by T. M. Brewer (1877b). It was subsequently referred to *caparoch* by Ridgway (1914: 779), and probably was an example of individual variation in the latter subspecies.

Northern Barred Owl

Strix varia varia Barton

Resident, fairly common in mixed woodlands in the southern half of the state, and apparently in lesser numbers elsewhere; subject to *incursions.*

Incursions. As is the case with a number of other resident species, there is considerable local shifting about of birds in late fall and early winter. It is interesting to note that Brewster (1925: 377) was very definite in stating that, whereas he had no evidence of "migratory flights" in the Umbagog region, he knew of their occurrence irregularly in Massachusetts.

In addition to local movements, there is evidence of more extensive flights or incursions. Data for these, which certainly were more widespread than indicated, are as follows: *1906,* thirty-five received, from September through part of November, by a taxidermist at Augusta, who had received two to five annually for about the preceding 12 years (Powers, 1906a: 107); *1908,* an "unusually large flight" and many shot in the fall in the vicinity of North Bridgton, Cumberland County (Mead, 1908b: 115); *1918,* a sizeable flight in October in Cumberland County (Norton); *1921,* "great numbers" in fall in the

vicinity of Machias, Washington County (Kilburn, 1923: 38); *1923–24*, eighty-five birds reported as received in fall by a taxidermist at Brunswick, Cumberland County (Walch, 1926: 53), with the flight continuing into early 1924 in the same county and throughout the state (Norton); and *1939*, a sizeable flight, October to November, with many birds brought to Portland taxidermists (Norton).

Breeding. "They nest in the larger natural cavities of trees along waterways or clearings, or very exceptionally take possession of an old Crow's or Hawks's nest" (Knight, 1908b: 255). No nest lining is added. Elsewhere, this species has been reported, on rare occasions, to build its own nest. The same site is used on successive years. The few Maine records are for clutches of two eggs, although the species is said to lay from two to four. Knight (ibid.) reported two eggs taken on March 27, 1894, at unstated locality. On April 7, 1941, Eckstorm secured two fresh eggs at Dedham, Hancock County. Fresh eggs may be expected about two to three weeks later than in Eastern Horned Owl nests. As for the incubation and fledging periods, from data outside of Maine, Bent (1938: 186–187) stated that the former probably is nearer 28 than 21 days, and, although the young leave the nest and move about in the branches at four or five weeks of age (actual flightless period being unstated), there is evidence that they are cared for, and probably fed, by both parents during their first summer and perhaps longer. One brood is raised yearly.

Ecology. This species is crepuscular and nocturnal. Of the birds in the Umbagog region, Brewster (1925: 374) wrote: "Although found almost everywhere throughout the forest, they prefer lowland to upland woods and are especially fond of haunting lake or river shores heavily timbered with intermingling evergreen and deciduous trees, the outermost ranks of which border on placid water or stretches of grass-grown marsh. In all such places they usually outnumber Owls of every other kind, particularly about the Lake where there is scarce a cove of any size that does not regularly harbour at least a pair of them."

Often a pair will occupy a small piece of woodland on the outskirts of settled areas. Occasionally they resort to barns, attracted by rats and mice, and may take up quarters there for a more or less extended period. Carpenter (1886b: 177) reported that in Kingfield, Franklin County, because of this habit, they were called "barn" owls. They also come into cities and towns and, if undisturbed, may remain for a considerable period, preying on doves, English Sparrows, rats, and mice.

Remarks. Mendall (1944: 204–206) reported on 129 stomachs containing food, from data gathered by Walter Clayton, mostly for birds

taken in the vicinity of Lincoln, Penobscot County, and with all seasons well represented. Items occurred in numbers of stomachs as follows: mice and rats in 53 (House Rats in 3; Meadow and Red-backed Mice predominating among identifiable material); Squirrels in 24 (Flying in 14, Red in 9, and Gray in 1); Snowshoe Hares in 24; shrews of three species in 15; and remains of a Mink in 1. Insects, including beetles, caterpillars, and grasshoppers, were found in 15, and various cold-blooded animals in a few others. No poultry was found, and only five birds had eaten Ruffed Grouse. Mendall concluded that this owl could not be considered beneficial in Maine, chiefly because of the hares eaten, but that its persecution should not be encouraged, for some of its feeding habits compensate partly for the harm done.

American Great Gray Owl

Strix nebulosa nebulosa (Forster)

Incursion visitant, occurring in small numbers (never common), arriving in early winter and very rarely lingering until early spring; probably also a rare straggler in other than incursion years.

Incursions. Flights arrive from November into January, generally in the latter month. Limits of occurrence are indicated by the following records: a bird received by a Portland taxidermist on November 8, 1906 (Deane, 1907b); one taken on March 2, 1890, at Biddeford, York County (Smith *in* Knight, 1897d: 67); one seen for several days in mid-March, 1943, at Portland (Haven); and one shot at Katahdin Iron Works in southern Piscataquis County in 1884 (Webster, 1884: 76), the date being April 24 (Smith).

In the winter of *1842–43*, seven were reported taken in Massachusetts (Abbot, 1844), but there are no Maine data at hand for this flight. Maine records include: *1884*, a small flight in the early part of the year (Smith); *1890–91*, twenty-seven specimens received by Crosby, a Bangor taxidermist, and the flight extending into eastern Massachusetts (Brewster *in* Minot, 1895: 344–345); *1902*, a small incursion the early part of the year, several birds reaching Cumberland County (Norton); and *1906–07*, birds noted from early November into February, and the flight noticeable westward into North Dakota (Deane, 1907b). There was an unusual number in Quebec in the winter of 1934–35, according to D. A. Déry (*in* Gross, 1935), but I have no data indicating a flight in Maine. As for the bird seen in March, 1943, cited above, I have no data to indicate whether it was part of an incursion or a straggler.

Ecology. This owl, chiefly nocturnal, has been seen in the state in a variety of situations such as in trees in the open, on fence posts, and

in thick woods, but perhaps occurs most often in trees in fairly extensive wooded areas.

Remarks. Carpenter (1884a: 9) reported an owl nest with two young that was found by his helper, on April 10 of unstated year, in the Katahdin region, and, from the description given him, wondered if it might not have been a Great Gray Owl's nest. I doubt very much that it was other than an Eastern Horned Owl's.

A specimen shot in January had eaten five Meadow Mice (Mendall, 1944: 207).

Tyson's sight record for "early fall" on Cranberry Island, off Mt. Desert Island (*in* Tyson and Bond, 1941: 63), is now considered questionable by Bond. There is an erroneous report of the occurrence of this species about Portland in late 1923 (Forbush *in* Tyler, 1924), which was based on misidentified Barred Owls (Norton).

American Long-eared Owl

Asio otus wilsonianus (Lesson)

Resident, probably found throughout (records for some counties are not at hand), and, while generally rather rare, perhaps fairly common in some sections.

Breeding. This owl is known to use the old nests of Crows and squirrels, usually 20 to 40 feet from the ground, and often in pine trees where there is much shade. "About May first is the time to look for eggs" (Knight, 1908b: 253). Usually four or five make a clutch. On May 6, 1931, Eckstorm took a set of six slightly incubated eggs at Brewer. On May 14, 1905, four fresh eggs were found in an old Crow nest in a fir tree at Warren, Knox County; the incubating bird put on an 'injury-feigning' display on the ground when frightened from the nest (Lermond, 1907). For outside the state, Bent (1938: 158) reported that an egg is laid every other day, with incubation (considered to be about 21 days) beginning after the first is laid. He also reported that the young leave the nest when four or five weeks of age, which is long before they are able to fly, and that the family group keeps together during summer and fall, and perhaps even longer. One brood is raised yearly.

Ecology. This nocturnal owl usually is found in mixed woodlands where the trees are not mature and numerous conifers are present.

Remarks. Although this owl generally is considered a resident, and known to occur in mid-winter north at least to central Maine, I believe that some individuals may perform more or less extensive migrations, for there are more records for spring and fall than for other seasons.

Spinney noted one on Seguin on April 5, 1897, and he shot one there on October 25, 1893.

Mendall (1944: 206) gave frequency of food items in 16 stomachs, of birds taken throughout the year mostly in the vicinity of Lincoln, Penobscot County, as follows: mice in 14 (White-footed and Meadow Mice predominating); shrews in 2; a bat in 1; and insects in 1.

"I believe this species may be locally common in a number of sections of the state" (Mendall).

Northern Short-eared Owl

Asio flammeus flammeus (Pontoppidan)

Summer resident, rare, though reported from widely scattered points throughout (no certain breeding record); *transient*, regularly uncommon in spring and in slightly larger numbers in late fall, noted chiefly coastwise; *winter resident*, apparently uncommon but regular in southwestern coastal areas and rare farther eastward. It seems probable that some birds are resident.

Spring. Migration probably begins in the second week of April, and records indicate that it is most noticeable during the last two weeks. One was seen on April 13, 1899, on Seguin (Spinney), where the species is not known to winter. A bird was shot on April 7, 1867, at Scarborough (Smith), but these owls have wintered there.

Fall. Migration apparently begins the last week in September, continuing rather evenly throughout October, and usually ending by November 7. Later records are for coastal areas and perhaps refer to wintering birds.

Flight year. In *1905*, this species occurred "abundantly" in fall in the Portland region (Brownson, 1905d).

Summer and breeding. For the Portland region, N. C. Brown (1882f: 20) gave this owl's status as a fairly common resident. Referring to summer occurrence, Smith (1882–83: 6) wrote: "Breeds on the ground; lays four dull white eggs . . . This owl is common all along the coast in suitable locations, such as marshes and meadows." Knight (1897d: 66; 1908b: 253–254) listed it as resident in a number of counties. The species was seen in the summer of 1918 at Caribou, Aroostook County (Kilburn, 1922b: 117). Tyson and Bond (1941: 63) stated that it probably was an occasional summer resident on Mt. Desert Island.

The four to seven (rarely nine) eggs reported for this owl should be sought in May or early June, on the ground, with little or no evidence of a nest, in a marshy place or possibly on a muskrat house. Incubation

requires about three weeks, fledging about five, and one brood is raised yearly.

Winter. At a time when this species may have been more numerous in Maine than at present, Smith, who lived near Portland, stated (1882–83: 6) that he had never known of its occurrence in winter; on the other hand, N. C. Brown, after more than a decade of intensive field work, stated (1882f: 20) that, in the Portland-Scarborough region, it was seen most frequently in autumn and winter. Knight's listings of the species as a resident have been referred to under Summer. A regular check on taxidermy shops undoubtedly would reveal that more of these owls occur in winter than have been reported by observers.

The specific records at hand, all for coastal areas, mostly for Cumberland County and mostly since 1924, are, perhaps, more indicative of the distribution of observers than of birds. They are: seen on December 15, 1910, at Ellsworth, Hancock County (Stanwood *in* Sweet, 1911b: 63); three shot on December 31, 1925, at Freeport, Cumberland County, by B. E. Smith; an "unwary" individual seen by Norton on February 23, 1926, at Scarborough, and two in flight seen by Mrs. F. Lowe on March 9 at Falmouth, Cumberland County (Norton); one seen on March 17, 1927, on Long Island in Casco Bay (E. N. Atherton); a live bird captured by two boys on January 31, 1931, in a Portland suburb, and brought to Norton; and, according to a letter written by C. H. Clark on February 7, 1931, to Norton, a pair had appeared the previous week at Lubec, Washington County, and one was secured for his collection. Tyson and Bond (1941: 63) listed this owl as probably a very rare winter resident on Mt. Desert Island.

Ecology. Smith (1882–83: 6) stated that this owl was rather diurnal in its habits, and that he had seen it feeding on bright sunny days, as well as during cloudy ones, and at evening. He wrote: "Its favorite haunts are marshes, and it resembles the marsh hawk in its habits of flying low over the meadows in search of its prey, upon which it pounces when discovered, but rarely pursues it."

In addition to fresh and salt water marshes, it also frequents meadows and the rank herbage along shores where sluggish brooks enter ponds or lakes. Although mainly terrestrial, it also perches on stumps, fence posts, and similar structures.

Remarks. Mendall (1944: 206) reported that four of these owls, secured in autumn in the vicinity of Lincoln, Penobscot County, "had eaten mice exclusively, chiefly meadow voles."

Boardman (1862: 123) reported this owl breeding, but he seems to have referred only to the Grand Manan archipelago, New Brunswick, rather than to the Calais region of Maine. Pettingill (1939a: 349) cited records of two sets of eggs taken at the former locality.

American Tengmalm's Owl; Richardson's Owl

Aegolius funereus richardsoni (Bonaparte)

Generally considered a *winter resident* or *visitant* in small numbers, sometimes fairly common during an *incursion*. Probably a rare resident also.

Migrations and winter. This owl usually is noted after mid-November, infrequently by the first of the month, and Audubon (1838: 559) reported a male captured "in the beginning of September," in 1832, at Bangor. The bird may be found almost anywhere in winters during incursion years. Late spring records at hand are: one captured on March 14, 1904, at East Hebron, Oxford County (Johnson *in* Noble, 1904b); March 16 of unstated year and locality (G. M. Allen, 1909: 111); said to be noted to March 25 (Knight, 1908b: 257); and a male taken on unstated date in April, 1877, at Dexter, Penobscot County (Smith, 1883: 285). Whereas the dates here given may indicate the time limits of migrating birds, the reader should note farther on, under Remarks, that there is evidence that this species may be resident.

Incursions. Maine data include: *1883–84*, quite a few of these owls taken at widely separated points in the state (Smith); *1902–03*, a flight that encompassed "several northern states in numbers sufficient to indicate a general southerly movement" (Swain, 1904b: 16); and *1922–23*, unusual numbers at Machias, Washington County (Kilburn, 1923: 38). This last flight has been discussed by Forbush (1927: 210) who pointed out that it extended over New Brunswick, Quebec, and much of New England, and that, after the middle of the winter, many starved owls, most of them dead, were picked up from the snow.

Ecology. This little owl is nocturnal. Usually it passes the day in a coniferous thicket, but during some winters it may be found almost anywhere, as in deciduous woodlots, hedgerows, and even in or about barns and other buildings.

Remarks. In a letter to S. F. Baird, dated January 4, 1865, Boardman (1903: 195) called this owl one of the uncommon "stragglers from farther north in summer" in the Calais region and adjacent New Brunswick. Bond (*in* Tyson and Bond, 1941: 63) stated that the species may nest in Hancock County, and that it "probably nests sparingly in northern and western Maine." These suggestions receive much support from the fact that, of 20 specimens recorded by Mendall (1944: 206), some were taken in April and May which is the breeding season of this owl. It is not known how many were taken at this particular season, for the 20 birds were reported as collected in all months except June, July, and August. Lack of captures of this

secretive owl during the summer months is hardly evidence of absence at this season, however, for not only does it inhabit thick coniferous growths, but also few persons carry guns into such places at this time.

The 20 specimens mentioned by Mendall (ibid.) were received by Walter Clayton, late taxidermist at Lincoln, Penobscot County, over a period of years from 1920 to 1942, and were all taken within 25 miles of that locality. Fifteen of the birds contained enough food for tabulation, frequency of occurrence of items in stomachs being as follows: mice (chiefly Meadow Mice) in 11; Short-tailed Shrews in 3; Domestic Pigeon in 1; and grasshoppers in 1.

An island record of interest is for a female shot on February 28, 1880, on Isle au Haut, formerly in Hardy's collection. On November 8, 1944, one was found dead at Augusta and brought to A. E. Brower.

Pettingill (1939a: 350) has summarized the few data for the Grand Manan archipelago, New Brunswick, listing the species as a rare resident and citing the set of five eggs taken on one of the islands on April 11, 1924, by R. Tufts. Bond has visited Grand Manan on numerous occasions and has stated (*in* Tyson and Bond, 1941: 63), on authority of Allan Moses, that this species is more numerous as a breeding bird on that island than is the Saw-whet Owl.

Acadian Owl; Saw-whet Owl

Aegolius acadicus acadicus (Gmelin)

Resident, probably quite common in areas of extensive coniferous forests and in lesser numbers elsewhere, but status not well known; subject to *incursions*, when sometimes common even in open country.

Incursions. Since some flights certainly involve movements greater than the length or breadth of the state, incursions seems to be the proper word for them. In the severe winter of *1884–85*, quite a number of these owls were found dead in the Calais region (Todd, 1885). In the fall of *1906*, to the middle of November, several were seen and one or two taken in the Portland region (Brownson, 1906e: 87); this flight was well reported for Ontario by Taverner and Swales (1911). Other Maine data include: *1929*, beginning in the first half of October, there was a sizeable flight which reached the coast and, according to a newspaper report, several of these owls flew aboard ships well at sea in the Gulf of Maine; *1931*, beginning in the second half of January, a small flight in Cumberland County (Norton); and in *1939–40*, birds were received by a Portland taxidermist all fall, including the last week of the year, and unusual numbers were present in southern Maine into March (Norton).

Breeding. This species nests in woodpecker holes, preferably of Flicker size, in stubs and trees in woods and swamps. Apparently no nesting material is added. The breeding season in Maine is considerably protracted. Carpenter (1884a: 9) collected two eggs on April 6 of unstated year, on the Upper Magalloway, in Oxford County. On April 30, 1881, he found three young in a nest at the base of Mt. Katahdin (Carpenter, 1884b). In both instances the owls had utilized holes in birch stubs, the first nest being only three feet from the ground. A nest was found in late May, 1936, in a Flicker hole nine feet above ground in a spruce stub on Mt. Desert Island (Tyson and Bond, 1941: 15–16, 63). Homer (1892) reported a nest in a deserted woodpecker hole at Monson, Piscataquis County; on July 6, 1891, four fresh eggs were taken from it, another set of four having been taken a "week or ten days previous," and the brooding bird had to be removed from the nest by hand; the third clutch of four, subsequently laid, was left to hatch.

Writing of this subspecies in general, Bent (1938: 232) reported that four to seven (usually five or six) eggs are laid, and incubation, variably reported as 21 to 28 (probably over 26) days, begins after the first egg is laid. Terrill (1931) studied a brood near Montreal, Quebec, and found that the three young, probably well able to fly, left the nest when the oldest was 28 to 32 days of age, and the youngest over a week younger. One brood is raised yearly.

Ecology. "Usually a denizen of deep woodland shade, in winter, at least, it frequently comes to the borders of the woods to bask in the sun, or perhaps is drawn there in the quest of mice which seem to form the chief part of its diet. At this season it also is frequently seen in orchards, and even in door yards, probably urged by hunger to stray far from its accustomed haunts, in quest of food" (Norton, 1926b: 110). Apparently this nocturnal hunter fits into about the same niche as Richardson's Owl, which replaces it in more boreal regions.

Remarks. Brewster considered the Saw-whet common in the Umbagog region in his day. I believe it is fairly common in western and northern Maine at present. Boardman (1862: 123) reported it as common in the Calais region. Kilburn (1922b: 117) considered it uncommon in Aroostook County, but more common in Washington. Norton believed that it nested on many spruce-clad islands from Casco Bay eastward, basing this on having heard birds on a number of islands in spring or early summer. It is reported to nest on Monhegan. It was considered a rare resident on Mt. Desert Island by Tyson and Bond (1941: 63).

For 21 stomachs containing food, of birds taken in all seasons except

summer in the vicinity of Lincoln, Penobscot County, Mendall (1944: 206) reported frequency of occurrence of food items as follows: mice in 18 (principally Meadow Mice); shrews in 4 (Short-tailed and Water Shrews); and an unidentified song bird in 1.

"On the morning of Jan. 7th I went into the grain shed of the camp [in Franklin County] and there saw sitting closely together on a joist, three Owls of this species" (Carpenter, 1886b: 177). Smith (1882–83: 6) reported one of these little owls, caught alive in January in Portland and kept in captivity, falling off its perch in "convulsions," the attacks growing more frequent until the bird died.

Some winters many of these owls are found dead. A large proportion of those picked up are in good flesh, which would rule out death from slow starvation. A possible explanation might be a die-off of the mouse population causing an incursion of the owls, or at least the necessity for ranging farther for food, and during a period of lowered energy from lack of adequate nourishment, the birds might freeze in cold weather.

Norton saw a Saw-whet on November 29, 1908, at Westbrook, Cumberland County, at about 4:15 P.M., and recorded in his notes: "Very alert and active. A flight of about 20 yards and again perching; swooping down, silent, swift, capable of sudden acceleration of speed. Appearance very like the Whip-poor-will."

Family CAPRIMULGIDAE

Eastern Whip-poor-will

Caprimulgus vociferus vociferus Wilson

Summer resident, common in young hardwood areas in most of the southern two thirds of the state, decreasing to fairly common farther northward, and very rare in coniferous forests, including coastal islands; *transient,* fairly common in spring and fall.

Spring. The Whip-poor-will usually arrives in southwestern counties by May 4, in Washington County by about May 12, and at Presque Isle from May 16 on, according to reports of birds heard and not seen. Early reports are for: April 24, 1856, at Cornish, York County (*in* Hough, 1864: 189); April 26, 1908, and April 28, 1913, at Westbrook, Cumberland County (Norton); and April 30, 1906, at Portland (*in* Brownson, 1907c: 38). It has been heard in Oxford County by May 2, and Mendall has reported it at Calais on May 5, 1938. The duration of migration is unknown.

Fall. Migration apparently begins in late August, is most noticeable in the first half of September, and usually the species has departed from eastern counties by the 20th, and from the state by the 28th. Later dates, for Portland, are October 1, 1925 (Mrs. F. Lowe), and October 6, 1935 (Norton).

Breeding. "The eggs, always two in number, are laid on the ground among the leaves and pine needles, usually under a bush, in a thicket or in rather open woods" (Knight, 1908b: 295). At almost the same spot in Westbrook, Norton found eggs as follows: in 1904, one on June 12 and a second on the 15th; in 1915, one on June 15 and a second one present when visited on the 19th; and in 1924, two on May 26. Two were found on July 1, 1937, in Baring Township, Washington County (Mendall). Near St. Lambert, Quebec, in 1933, Terrill (*in* Bent, 1940: 167) found the incubation period to be at least, and possibly nearer, 20 days and the young to move a few rods away from the hatching site at about seven days, being capable of short flights at 16 days of age; they were cared for by the female. One brood is raised yearly.

Ecology. Usually this bird is found in deciduous growth, ranging from thickets with scattered trees to areas of immature hardwoods where there is undergrowth, or in mixed growth. In its nightly hunting for food, it appears to prefer edges, being flushed most often from the borders of fields, clearings, and along wood roads. I have seen more birds in the Penobscot drainage than elsewhere, noting them about the edges of clearings or flying over the arrowhead and other aquatic growth at the margins of ponds and relatively slow-moving waters. I do not recall ever seeing one over 15 feet above ground or the water's surface, six to eight feet being the usual altitude. When two (probably a pair) are noted, one sometimes will follow the other at a short distance, the birds obviously having a definite 'beat,' and passing the same point at fairly regular intervals. Although the species is equally at home on dry uplands and on low well-watered situations, their eggs are deposited in a dry shady place.

Remarks. Early records show that the Whip-poor-will was widely distributed in the state many decades ago, although apparently found in greatest numbers in southwestern hardwood areas. It has increased very noticeably in many sections, especially in northern and eastern counties, during the past 40 years. The increase was not apparent after the original timber was removed, but rather after much land was cleared and cultivated, and young deciduous thickets were a prominent feature of the environment. Whereas it is now fairly common in some sections where it was scarce at the turn of the century, it is still locally rare in apparently suitable areas, for reasons not understood.

Eastern Nighthawk

Chordeiles minor minor (Forster)

Summer resident, common throughout except absent from coniferous forests and most islands along the coast; *transient,* common in spring and fairly numerous in fall.

Spring. The great variation in arrival dates, from May 1 to about the 25th, apparently is due to variations in weather, but probably is more apparent than actual, as the birds are silent (hence often overlooked) for a while after arrival. Early dates for various localities are: May 1, 1909, at Farmington, Franklin County (Marden *in* Legge, 1910a: 37); May 6, 1905, at Fort Kent, Aroostook County (Morin *in* Sweet, 1906b: 36); and May 9, 1859, at Steuben, Washington County (*in* Hough, 1864: 191). (See last paragraph of Remarks for April reports.) In 20 years at Presque Isle, Chamberlain has noted this species twice on May 18, and on varying dates to the 28th in other years. Migration apparently continues into early June, even in southwestern Maine.

Fall. Small flocks, which may have been migrating, have been seen as early as the first week in July. The southward movement becomes definite by mid-July and reaches its peak the latter half of August. Occasionally, several hundred birds are seen moving southwestward in a long straggling flock, usually in the afternoon. Late dates are: two seen on September 13, 1941, on Mt. Desert Island (A. C. Bagg); a flock of 11 on September 15, 1929, at Brunswick, Cumberland County (Palmer); a single bird seen on September 21, 1901, at Deering, Cumberland County (Norton); and September 26 for Portland and October 2 for Livermore Falls, Androscoggin County (*in* Bent, 1940: 234).

Breeding. No nest is made, the two eggs being deposited on the ground in gravelly or rocky areas or small outcrops, sandy places, in pastures, quarries, on cinders, on the forest litter in burned woodlands, or on flat (usually graveled) roofs of buildings. "I remember a ledge of rock back of the settlement of Wilson's Mills [Oxford County], which seemed a favorite breeding place for these birds, and in the space of every four or five rods a female was sitting on her eggs" (Samuels, 1865: 400). At Gardiner, Kennebec County, five pairs nested on an old deserted dock (Gross *in* Bent, 1940: 209). At Farmington, one of these birds laid her eggs in a deserted Robin's nest in a tree, probably for five successive years (Jewell, 1908).

The following Maine data are summarized from Gross (*in* Bent, 1940: 209–221). Thirty egg dates for the state range from May 24

to July 3. The two eggs may be moved short distances by the brooding bird to enable her to keep in the shade. One banded female at Brunswick occupied the same graveled roof for four successive years, although not with the same mate. Incubation begins as soon as the second egg is laid and requires 19 days. Gross did not find the male assisting in this, although such is reportedly the case elsewhere in the bird's range. The young move about in search of shade before being able to fly. One chick made short flights when three weeks old, and began catching moths at the age of 25 days. The female did not visit this chick after it was 30 days old, except to feed it, but the chick continued to come to the roof until 52 days of age when, on August 15, it presumably departed on migration. One brood is raised yearly.

Ecology. This bird is more diurnal and crepuscular than nocturnal, frequently being seen hawking for insects above fields, watercourses, trees, or the roofs in towns and cities, in broad daylight as well as at dusk or on overcast days. It also is often on the wing until late at night during summer, but apparently seldom during the hours before dawn. In fall the straggling migrant flocks feed in daylight as they move leisurely across the countryside. "In northern Maine this bird is frequently called 'Burnt Land Bird' because of its liking for newly burned over clearings where it nests" (Kilburn, 1924: 67). It perches on the larger, and usually fairly horizontal, limbs of trees, as well as on flat roofs or the ground. Most feeding is done high in the air, in marked contrast to the habits of the Whip-poor-will. It is gregarious during migrations, but not colonial when breeding, several sets of eggs within a short distance of each other merely indicating a limited amount of preferred sites for them.

Remarks. "On the flat, graveled roofs of certain buildings in Bangor, nighthawks have nested for at least six consecutive years, and I can always be sure of finding the eggs and young" (Knight, 1898a: 12). This is the nearest we can come to dating the beginning of nesting on roofs in the state.

Gross (*in* Bent, 1940: 211) stated that, according to his observations, this species has been increasing in Maine for the past 25 years. Actually, however, the increase is only apparent, for more birds have nested on roofs in the last few decades, and thus were more conspicuous in centers of human populations. Elsewhere, as a matter of fact, the species has decreased gradually throughout the state over a long period. Brewster's discussion (1937: 468–475) of the decline in numbers of this species in the Umbagog region is the clearest picture of what has happened in some forested areas.

Reports of occurrence on April 22 and 27, published in the *Journal of the Maine Ornithological Society,* are believed to refer to occurrence on similar dates in May.

Family MICROPODIDAE

Chimney Swift

Chaetura pelagica (Linnaeus)

Summer resident, common to numerous (colonial breeder) in settled areas and fairly common elsewhere; *transient,* numerous in spring and fall.

Spring. This species usually arrives in southwestern Maine by May 4 and occasionally as early as the very last days of April. Early dates for various localities are: April 21, 1911, at Kittery Point, York County (Rogers, 1914: 272); April 27, 1905, at Skowhegan, Somerset County (Swain *in* Sweet, 1906b: 36); April 28, 1938, at Lewiston, Androscoggin County (P. A. Wright); and April 30, 1882, at St. George, Knox County (Norton). There are a number of April 30 records for Cumberland County, and May 4 for Penobscot, and Chamberlain has seen the species at Presque Isle once on May 7, once on the 9th, and from the 15th to 30th in other years. Migration apparently extends into early June.

Fall. The number of birds seen diminishes rapidly during the last two weeks of August, with very few occasionally seen in early September. There are three September 11 reports at hand, plus these later ones: two seen on September 12, 1941, at Cape Rosier, Hancock County (P. Allison); four seen on September 15, 1944, at South Brooksville, Hancock County (K. Tousey); and September 17 of unstated year at Orono, Penobscot County (*in* Bent, 1940: 292).

Breeding. Nests are glued to the inside of chimneys or barns and rarely elsewhere (see Remarks). Knight (1908b: 301–302) gave a rather full account of his observations, showing that the breeding cycle is very protracted. His account is here condensed. A pair began building on May 15, but eggs were not laid till mid-June. The twigs were glued to the inside of the chimney with saliva. "The bird . . . braced itself against the bricks with its feet and tail and proceeded to labor long and earnestly to attach the twig to the bricks, evidently seeking to thoroughly cover the foundation with gummy saliva. Only two or three twigs were attached the first day." Both birds brought twigs and worked on the nest, but only one at a time. Eggs (four) were laid every other day. The first hatched in 19 days, and the others

at daily intervals, so that the last hatched 22 days from the time the first was laid. Observations were interrupted, but the young were known to have left between 29 and 31 days after hatching.

Harris secured three fresh eggs on June 18, 1923, in a barn at Grafton Oxford County, and Eckstorm secured five, advanced in incubation, on July 1, 1939, in Washington County. These two sets represent the normal limits of clutch size. Parents were seen feeding young in a chimney on August 22, 1908, at Portland (Norton), and flightless young fell down a chimney on August 25, 1909, at Ellsworth, Hancock County (Stanwood *in* Knight, 1909c). One brood is raised yearly.

Ecology. This aerial species is gregarious even when nesting. It may be seen flying over any type of land or water, hawking insects at varying altitudes. Whereas most of these birds now resort to man-made structures for nesting, Knight (1908b: 302) thought that in his day some nested in hollow trees. It is possible that those seen in flight in remote mountainous areas may utilize either trees or crevices in rocks for perching or nesting.

Remarks. By 1671 or earlier, some of these birds had forsaken their natural nesting places and occupied chimneys at Scarborough. Josselyn (1672; 1865a: 40) wrote: "The *Troculus,* a small Bird, black and white, no bigger than a Swallow, the points of whose Feathers are sharp, which they stick into the sides of the Chymney (to rest themselves, their Legs being exceeding short) where they breed in Nests made like a Swallows Nest, but of a glewy substance . . . They commonly have four or five young ones, and when they go away, which is much about the time that Swallows use to depart, they never fail to throw down one of their young Birds into the room by way of Gratitude. I have more than once observed, that against the ruin of the Family these Birds will suddenly forsake the house and come no more."

Although Knight (1908b: 302) wrote that he had seen these birds entering hollow trees, I find no account of a nest found in Maine in such a location. They have been reported nesting in deserted camps (Sage, 1881; Smith, 1882–83: 504; Powers, 1896), and in barns and an old well (Morrell, 1899a). Several hundred were reported roosting in a barn in early August (Kennard *in* Bent, 1940: 289).

When there are long periods of damp weather in summer, nests may come loose and fall down, causing the death of a great many young birds. Such was the case in 1922 (Norton). I believe that there is greater mortality from this cause than from starvation of adults resulting from lack of insect food during periods of summer cold. At such times the old birds may remain roosting and relatively inactive for several days without apparent harm.

Family TROCHILIDAE

Ruby-throated Hummingbird

Archilochus colubris (Linnaeus)

Summer resident, common on most of the mainland, including clearings in forests, and on larger islands; *transient,* common in spring and numerous in fall throughout.

Spring. This bird usually arrives in southwestern Maine by May 15; the peak of migration is from about the 20th to 26th. Early dates for various localities are: May 6, in 1902 at Westbrook, Cumberland County (Norton), and in 1905 at Hebron, Oxford County (Johnson *in* Sweet, 1906b: 36); May 7, 1906, at Saco, York County (Abbott *in* Brownson, 1907c: 38); May 8, 1896, at Seguin (Spinney *in* E. H. Norton, 1902); and May 9, 1944, at Hampden, Penobscot County (Mrs. P. Hannemann). Chamberlain's earliest date for Presque Isle is May 20, with first records for other years to the 30th. That migration in the state continues into early June is shown by the fact that the species occurs frequently at that time on grassy islands off the coast, from which they soon become absent until early autumn.

Fall. Birds begin migrating during the first week in August, the flight becoming conspicuous by the 10th, and by mid-August considerable numbers may be noted not only on coastal islands but also in clearings in the forest and in gardens in villages and cities. At such concentration points, where suitable flowers are in bloom, numbers are seen often for over a week, perhaps some arriving while others are leaving. Numbers decrease during the first half of September, a very few staying until the 10th. Later reports of occurrence are: September 17, 1947, at Tenants Harbor, Knox County, and September 20, 1945, at Hampden (Mrs. P. Hannemann); September 24, 1902, at Westbrook (Norton); September 25, 1938, at Blue Hill, Hancock County (M. Brewer); September 26 of unstated year and locality (G. M. Allen, 1909: 124); "to even October 1" (Knight, 1908b: 303); and a bird remaining until October 5, 1945, at Brunswick, Cumberland County (J. Veghte).

Breeding. According to Knight (1908b: 304–305), the nest usually is saddled onto a limb of a forest or orchard tree, or attached to any sort of shrubbery, usually five to 40 feet from the ground. He stated that maple, birch, pine, and apple trees are common sites, and that the female apparently does all of the building, which may continue even after the two eggs are laid. The following breeding data are Norton's unless otherwise stated. There were two eggs on May 31, 1936, and two eggs about June 1 (hatched June 11), 1937, at

Portland. On June 13, 1921, a female was seen gathering lichens, which would indicate that her nest was about finished, at Woolwich, Sagadahoc County. An "aerial dance" was observed on July 11, 1938, at Beddington, Washington County, and Norton was told that the female already had raised a brood in that locality. On July 11, 1908, a fully fledged young was picked up from a sidewalk, under elm trees, at Westbrook. There were two eggs on July 17, with last young not out of the nest until August 20, 1938, at South Portland. On August 14, 1913, a female was seen guarding a nearly completed unused nest at Thomaston, Knox County. At Berwick, York County, Dr. Anne Perkins observed that, about two weeks after the young left a nest in a tree, a female was incubating on another nest in the same tree. The date was August 8, 1942, and, since the female on the second nest seemed more shy, possibly the same bird did not build both nests. Knight (ibid. 305) stated that incubation, by the female, required 12 days, but other writers outside the state have found that 14 probably is correct; he also stated that fledging required 15 days, but it probably varies and this is about average. The female does all the caring for the young. Data here given indicate that two broods are raised yearly in Maine.

Ecology. This is a bird of gardens, woodland edges, and clearings in the forest—in fact wherever there is suitable food plus trees or shrubbery for shelter. They often are noted about flowering cherry trees, shadbushes, and in gardens where blossoms of nasturtiums and golden currants are favored sources of nectar and insects. In woodlands and along roadsides they gather at patches of jewelweed and fireweed.

The habit of feeding at pits dug in trees by the Yellow-bellied Sapsucker is now fairly well known. On July 11, 1913, at Dedham, Hancock County, Eckstorm noted a pair of these birds "hovering about a white birch tree, where the sapsuckers were working, and sucking the sap and catching small insects." A. R. Phillips noted the same habit on Mt. Katahdin on August 22, 1929, and again on August 21 of the following year. Dr. A. E. Brower submitted the following details regarding his observations on June 16, 1940, at Augusta: "Along a wood road through mixed growth a group of white birches stand, and up about 30 feet on several trees groups of sapsucker pits were present. At one of the fresher looking groups of pits the hornets and a hummer were feeding. At intervals of one to three minutes the bird would fly to the pits, dashing at the hornets. If the insects backed away, the bird would insert its beak as at a flower. Apparent feeding was observed 15 times and also a number of additional abortive attempts were observed when the hornets did not give way. After most

of the recorded visits to the group of pits under observation, I discovered that the bird was spending part of the intermissions at another group of pits on a tree some feet away in the forest." I observed them at sapsucker pits on a number of occasions in the summer of 1941 at Allagash Lake in northern Piscataquis County. Dr. Anne Perkins noted both hummers and sapsuckers coming daily to pits in a mountain ash at Berwick. She stated that the sapsuckers drove the hummers away.

The species is not gregarious by nature, even in migration, although, especially in fall, several may be seen to fly by a given point at irregular intervals.

Remarks. Not infrequently these birds are picked up, chilled or dead, after a cold night in May. Probably mortality is due to a combination of cold weather and scarcity of food, since there is evidence that they can survive low temperatures. Brewster (1937: 480) reported a great decrease in numbers of these birds in the Umbagog region after 1879.

The male is very aggressive in defending his territory against invaders, and will fight creatures varying in size from bumblebees and hornets to warblers, goldfinches, flycatchers, and larger birds. In the vicinity of Ellsworth, Hancock County, Miss Stanwood (1911d) saw a hummer pursue a Hairy Woodpecker. She wrote of the woodpecker, "in spite of the jabs of his persecutor, he began to bore holes for insects." When a hole had been drilled, the hummer "descended upon him and drove him away." One wonders whether this was territorial defense on the part of the hummer, or a case of mistaking the woodpecker for a sapsucker.

Although males with red throats are conspicuous in spring, they become scarce after the end of July. On August 14, 1930, I saw a single nuptial-plumaged male among at least 15 individuals in a patch of jewelweed at Brunswick. The only later instance seems to be mention of one with a "rusty throat" seen on September 9, 1918, on Monhegan, by Dewis (1919: 39).

Since, in hunting for flowers, this bird seeks bright objects that contrast with the background, Hardy's experience on a Maine island provides an interesting sidelight; he wrote (*in* Bendire, 1895: 194): "We had been living on lobsters, and lots of their red shells lay near the fire in front of our tent, when suddenly a Hummer came out of the fog and darted down at the shells, moving from one to another, seemingly loath to leave them."

Rich saw a hummingbird flying over the summit of Mt. Katahdin on August 29, 1924 (Palmer and Taber, 1946: 306). Another was seen on the tableland on the mountain, at Saddle Spring, on September 7, 1947, by W. H. Drury, Jr.

Josselyn, coming to Scarborough from a land where there were no hummers, was impressed sufficiently with this species to list it first under birds in his *New-Englands Rarities* (1672; 1865a: 39): "The *Humming Bird*, the least of all Birds, no bigger than a *Dor*, of variable glittering Colours, they feed upon Honey, which they suck out of Blossoms and Flowers with their long Needle-like Bills; they sleep all Winter, and are not to be seen till the Spring, at which time they breed in little Nests, made up like a bottom of soft, Silk-like matter, their *Eggs* no bigger than a white Pease, they hatch three or four at a time, and are proper to this Country." Again in his *Voyages* (1674; 1865b: 79), he wrote: "The *Colibry*, *Viemalin*, or rising or waking Bird, an emblem of the Resurrection, and the wonder of little Birds."

Family ALCEDINIDAE

Eastern Belted Kingfisher

Megaceryle alcyon alcyon (Linnaeus)

Summer resident, fairly common throughout; *transient*, common in spring and fall; *winter resident*, uncommon but regular, mainly coastwise from Hancock County westward.

Spring. Many birds arrive in southwestern counties during early April, with migration continuing there at least to the end of the month. The spread of the population throughout inland waters comes very shortly after the ice goes out. At Presque Isle, Chamberlain has noted this species as early as April 16, but usually from about the 25th into early May.

Fall. There is considerable post-breeding wandering, beginning in late July, and with birds gathering at suitable feeding places. Migration begins in September, being most noticeable in early October, and is about over by October 20.

Breeding. "The nest is at the end of a burrow excavated in the face of a steep bank usually near water, but sometimes a long distance away from any water. The burrow varies in length from three to eleven feet, extending back horizontally into the bank and at the end widening into a circular chamber. Here the eggs are laid on a bed of sand and occasionally a few fish bones" (Knight, 1908b: 270). As a matter of fact, the nest may be in gravelly soil, or where there is a strong element of clay. Usually the tunnel is dug near the top of the bank and the passage is not always straight. "The full complement of eggs varies from four to eleven, usually six or seven, and these are laid as early as May 15 to well along in June. Both birds aid in excavating and take turns in incubating" (ibid. 271).

A clutch of six eggs, taken on May 14, 1890, at Falmouth, Cumberland County, by Norton, is the earliest record at hand. Six "perfectly fresh" eggs were found as late as June 22, 1880, at Upton, Oxford County, and the male bird, showing brood-patches, was taken from the burrow (Brewster, 1937: 412). Writing in general of this bird, Bent (1940: 115) stated that incubation was said to be about 23 or 24 days, and the young (which are hatched naked) remain in the nest four weeks or more, until able to fly. They are fed by at least one parent for a short time thereafter, until they are able to fish for themselves. One brood is raised yearly.

Winter. In his Norway, Oxford County, list, A. E. Verrill (1862a: 144) wrote that this species sometimes was seen in winter. Three or four birds were noted for several winters at Vinalhaven, Knox County (Medicus, 1881). Smith (1882–83: 505) stated that the species was reported to remain all winter, and that he had seen kingfishers in every month except January and February. One was seen on open water at Merrymeeting Bay on December 16, 1921 (Earl Brown); at Pittsfield, Somerset County, on December 27, 1905 (Noble, 1906: 28); and on the Androscoggin River at Lewiston, Androscoggin County, in December, 1938, by various observers. There are enough records for the western half of the coast since 1930 to indicate that a few of these birds winter there regularly.

Ecology. This bird is found fishing on waters of all kinds, including streams, ponds, lakes, tidal, and marine waters about islands. The summer distribution is limited somewhat by available sites for nesting burrows. In the Umbagog region, Brewster (1937: 411) noted that, on windy days when fishing on the lake was difficult, the birds flew into the woods to sheltered ponds and streams. This species is not gregarious, even though a number may gather at favored feeding places outside the breeding season.

Remarks. Hardy (*in* Bendire, 1895: 36) wrote of having shot a kingfisher that had swallowed a pickerel considerably longer than the bird itself. Brewster (1937: 414) reported seeing a kingfisher dive and strike a fish so large that the bird had to let it go after a brief struggle. At Grand Lake, Washington County, Kennard (*in* Bent, 1940: 125) reported seeing one of these birds dive, disappear beneath the surface, and not emerge; presumably a large fish had caught it, since a search revealed no trace of the bird. Although preëminently a catcher of small fish, and largely coarse fish at that, this bird feeds on a more varied diet than often is stated. Two young birds, shot on July 14, 1881, at Kennebunkport, York County, had been fed beetles of the Families Carabidae, Scarabaeidae, and Dytiscidae (Hayward, 1885). One of these birds was seen killing and eating young English

Sparrows at Augusta (Noble, 1905b). They also have been observed catching butterflies and moths (Knight, 1908b: 270).

The interesting data given by Brewster (1937: 409–415) include observations on a bird perching for the night in a birch tree in early fall.

This bird was recorded first for the state by Josselyn (1674; 1865b: 80), who mentioned "*Kings fishers*, which breed in the spring in holes in the Sea-banks."

Family PICIDAE

Northern Yellow-shafted Flicker

Colaptes auratus luteus Bangs

Summer resident, common except in unbroken forests and on islands where there are no sizeable trees; *transient*, numerous in spring and fall, especially coastwise; *winter resident*, uncommon but regular, chiefly on or near the western half of the coast.

Spring. This species usually is present in considerable numbers by April 12 in southwestern Maine, and occasionally by the first week of the month. In different years at Presque Isle, Chamberlain has noted the first birds on dates from April 8 on, averaging about the 22nd.

Fall. Migration begins by September 12 or earlier and continues to October 15 or later. A few migrants occasionally linger until well into November.

Breeding. A cavity is dug in a live, or, more often, in a partly decayed or dead tree. Usually a hardwood tree is chosen, apple, poplar, and yellow birch most often being selected. Dead stubs also are used. Sometimes an old cavity is enlarged and used a second time, but more often a new one is dug in the same tree or nearby. The entrance generally is five to 25 feet from the ground, but may be lower or much higher. Clutches ordinarily consist of six to nine eggs, and usually are completed during the first week or so in June. In Iowa, Sherman (1910: 143) has reported incubation as 11 to 12 days. The following data are from my studies of several nests in Brunswick, Cumberland County, from 1929 to 1933: both sexes aid in digging the cavity, and in some cases the chips are left where they fall and in others they are carried away; both sexes incubate, and in some instances when one came to relieve the other, a pair was observed to posture in the nest tree up to the day the eggs hatched, and in another, the nest cavity was enlarged (probably by the male) during this period and a full pint of chips nearly buried the eggs; my earliest date for eggs is indicated by six young on June 6, 1933 (the seventh egg did not hatch); most

eggs of a clutch hatch on one day and the remainder, usually one, the next; egg shells are removed from the day of hatching to four days after, and unhatched eggs up to eight days; both parents feed the young by regurgitation; and young climbed about inside the nest cavity from 11 days, and left the nest at 17, except in one instance where the male met with an accident to his eye and apparently was unable to aid in feeding, and fledging then took 21 to 22 days. One brood is raised yearly.

Winter. In the previous century this bird was reported from Vinalhaven, Knox County, in January, 1884, by Medicus II (1884); one, wintering in an ice house, was shot on January 14, 1885, at Popham Beach, Sagadahoc County (Smith, 1885); the species wintered in 1888–89 in the Portland region (J. C. Brown, 1889: 281); and several were reported to have wintered with Robins at Eliot, York County, in 1897–98 (Knight, 1898d). There have been many records for subsequent years, mainly for coastal counties in southwestern Maine. In January, 1921, the species was noted at Lubec, Washington County (Clark, 1921). It has been found inland at least to Brewer (Weston) and to Greene, Androscoggin County (Mendall). In the winter of 1935–36, many more than usual were present on islands and the coastal mainland.

Ecology. This is the most terrestrial of our woodpeckers, reaching its greatest population density in farmlands, where there are trees in which to nest, and open fields, roadsides, and pastures, where it can search for ants on the ground. Migrating birds may be seen almost anywhere, even on treeless islands and ledges off the coast. The species is somewhat gregarious in fall, as well as social, migrating with flocks of Robins.

Remarks. This species eats considerable fruit, especially wild cherries and blueberries. Hardy (*in* Bendire, 1895: 133) wrote that flocks gather to eat blueberries and that the entrails of such birds are dyed blue from this food.

On September 18, 1909, Eckstorm shot an unusually colored specimen at Brewer, which is now in the Brewster collection at the Museum of Comparative Zoölogy. There is a pinkish tint on the four outer primaries of each wing and the tail is similarly colored. The bird is an over-colored example of the subspecies *luteus*, rather than a vagrant from some distance place. Boardman (1871c) reported a melanistic Flicker, "black as a grackle and breeding with a woodpecker of the usual color," in the Calais region.

The effect of competition with Starlings for nesting sites needs study. I have known of Flickers driving away Starlings time and again, the male Flicker defending the nest and eggs from repeated attempts of

the Starlings to enter the cavity. Yet Starlings nest earlier and so occupy numerous sites that might otherwise be reused by Flickers.

Boreal Yellow-shafted Flicker

Colaptes auratus borealis Ridgway

Two records (perhaps three); status unknown, but probably a regular transient in small numbers in spring and fall.

Records. This race is characterized by its large size. In Table 2 are measurements in millimeters of three birds in the collection of the Portland Society of Natural History. The first bears the Society's number 793; the second is number 3216 in the collection of N. C. Brown; and the label is missing from the third, but almost certainly it is a Maine specimen.

Table 2

Measurements of Boreal Flickers

Locality	*Date*	*Sex*	*Chord of Wing*	*Tail*	*Culmen*
Portland	Oct. 11, 1935	♂	165	115	35
Cumberland County	May 7, 1881	♂	166	107[1]	36
(label missing)	?	♀	165	114	35

[1] Tail probably 115 mm. as estimated 8 mm. of tip broken off.

Northern Pileated Woodpecker

Hylatomus pileatus abieticola (Bangs)

Resident, varying from decidedly uncommon though regular to fairly common throughout, perhaps occurring in largest numbers in mixed woodlands in western Maine, and absent from most marine islands.

Breeding. A deciduous tree on low ground usually is selected for a nesting site, with the entrance to the cavity over 25 feet up, but below the crown. Live or dead trees, as well as tall stubs, are used. In his study at Ithaca, New York, Hoyt (1941) found that the male does most of the digging of the nest cavity, and about a month is required to complete it. C. H. Morrell (1901), who noted that the same cavity may be enlarged and used another year, found clutches to consist of three or four eggs, at Pittsfield, Somerset County. His records are:

two eggs on May 11 and another added by the 15th, 1896; four "nearly one-half incubated" on May 13, 1899; four "much incubated" on May 12, 1900; four on May 14, 1898; three on May 20, 1897; and eggs hatching on May 28, 1895. On May 14, 1941, Eckstorm secured a set of four eggs, about half incubated, at Dedham, Hancock County.

In New York, Hoyt (1941) found eggs to be laid at the rate of one per day, and that the male incubated at night, in fact doing the larger part of this function during the 18-day period. The young were fledged at 26 days of age, and remained with the parents into late fall. Elsewhere (Hoyt, 1944: 384), he has stated that other observations show the fledging period to vary from 22 to 26 days. One brood is raised yearly.

Ecology. According to Hardy (*in* Bendire, 1895: 104), this species "rarely leaves the vicinity of large timber. It prefers places where large hemlocks abound, especially those localities where a few have been killed by camp building or small fires. In fall and winter a pair will regularly visit such trees every day for weeks, spending hours daily in stripping off the bark, until trees from 2 to 3 feet in diameter are often entirely denuded or large patches of bare wood are exposed. In the Spring I have often seen bushels of bark under a single tree." Although it is true that formerly these were birds of the wilderness, many have altered their habits in the past 25 years. Quite a number now live in rather thickly settled areas in southern Maine, in places where they had been extirpated formerly, occupying patches of mixed woodland of no great size and flying over open fields, roads, and houses, to feed in adjoining woodlots.

Knight (1908b: 281) stated that, next to the Flicker, this is our most terrestial woodpecker, for it "likes to tear open the ant hills found in open places in the woods and feed on ants and their larvae." Probably in Maine, as Hoyt (1941) found in New York, a pair occupies the same area throughout the year for successive years, feeding within a radius of four or five miles of the roosting place, and roosting in holes near each other through the winter months.

Remarks. For many years this species was rare or absent in much of southern Maine. Smith (1882–83: 505) stated that it was not found on the coast. By 1935 it was found regularly in coastal areas from Cape Elizabeth eastward, and now occurs rarely in southern York County.

Hardy (*in* Bendire, 1895: 103) wrote: "I have seen one pick a large hole through 2 inches of frozen green hemlock to get at the hollow interior, and it seemed impossible that a steel tool of the same size could have done such work without being broken." F. Herrick (1910: 124) described a hole, in an unsound pine that contained

numerous carpenter ants, that had been dug through nearly five inches of solid sap wood to the heart of the tree; he estimated that over 300 cubic inches of wood had been removed. The chips from such borings are often several inches in length, and the holes are generally rectangular in shape, or slits following the grain of the wood.

"It is largely insectivorous, eating beetles and the larvae thereof, especially the timber boring species, also ants and their larvae, and in fall dogwood berries, choke and black cherries and other wild fruits and berries, also beechnuts and acorns for which it has a decided fondness" (Knight, 1908b: 281). The stomach of a September specimen was "well stuffed with large black ants, wood-boring larvae and a considerable quantity of whole fruits and stones of the choke-berry, besides indistinguishable remains" (C. H. Morrell, 1897).

The type locality of the subspecies *abieticola* is Greenville, Piscataquis County (Bangs, 1898: 176).

Eastern Red-bellied Woodpecker

Centurus carolinus carolinus (Linnaeus)

No record, although its presence was implied by Audubon (1839: 170), who stated that it bred "in all convenient places" from Maryland to Nova Scotia.

Eastern Red-headed Woodpecker

Melanerpes erythrocephalus erythrocephalus (Linnaeus)

Occasional *visitant* or *resident* for a season or longer, occurring mainly in spring and fall, but also in summer (two *breeding* records) and winter, and has occurred throughout, but rarely in eastern and northern Maine, and most often in York and Cumberland Counties.

Migrations. From data at hand it is difficult to determine whether the species is migratory or whether it merely wanders considerably before and after the breeding season. Whatever the case, there is an increase in records for May, with the earliest spring date, as given by Smith (1882–83: 505), for April 3, 1882, at Portland. Another increase, in fall records, occurs mainly in September, and chiefly on the coastal mainland and inshore islands.

Flight year. In *1877*, this species was "not uncommon" in the fall in Cumberland County (Smith, ibid.). The species was then far more numerous in other parts of New England than it is now.

Breeding. This woodpecker is said to nest well up in hardwood trees, usually in dead limbs or trunks, laying four to seven (generally five)

eggs. In June and July, 1926, a pair nested about 20 feet up in the stub of a limb in an elm tree at Cumberland Center, Cumberland County, both parents being seen carrying food into the nesting hole (H. Copeland, 1926; Haven, 1926b), and the next year, Norton received reports that the birds were summering there again, probably breeding but details are lacking. In June and July 1927, a pair nested about 50 feet above ground in a dead limb of an oak tree at Brunswick, Cumberland County, where, after school, I used to watch the birds. From data outside of Maine, Bent (1939: 197) reported incubation as about 14 days and fledging 27. In some parts of the species' range, more than one brood may be raised yearly.

Winter. One lingered from November to December 25, 1881, in Portland (N. C. Brown, 1882f: 20). One was seen several times in November and December, 1929, and in January, 1930, at Freeport, Cumberland County (W. C. Kendall).

Ecology. This is an open country bird, generally being seen in deciduous trees in roadside groves and farm woodlots.

Remarks. Norton (*in* H. Copeland, 1926: 545) has discussed additional, though unsatisfactory, evidence of breeding in the state.

In 1882 Smith (1882b) wrote that, within the last few years, specimens had been taken in Maine each year, but he knew of no instance of the species having been observed in Maine until within a dozen years or less. From data at hand, it appears that numbers declined before the end of the century.

Yellow-bellied Sapsucker

Sphyrapicus varius varius (Linnaeus)

Summer resident, fairly common in the interior of western Maine, uncommon but regular elsewhere in the interior, diminishing to rather rare and local near the coast (perhaps not nesting on islands); *transient,* common in spring and fall throughout and some seasons also fairly common on islands; one *winter* record.

Spring. This species arrives in April, generally appearing in southwestern counties by the 10th and throughout by the 20th. Perhaps a few individuals occasionally arrive the very last of March. Chamberlain has noted it at Presque Isle as early as April 11. Migration continues well into May, the later arrivals being mostly females.

Fall. Most birds depart from mid-September to October 17. Knight (1908b: 279) stated that the species occasionally was seen to November 15. The latest record at hand is November 27, 1913, at Phillips, Franklin County, as given in Oberholser (1928: 256).

Flight year. In *1905*, the fall migration appears to have been concentrated largely in the first week of October, for this species was abundant at this time in southwestern Maine (Norton).

Breeding. Nest cavities are dug in live, partly decayed, or dead deciduous trees or in dead conifers, generally near water. Yellow birches and poplars most often are selected, a new hole usually being dug on successive years. Both sexes help dig the cavity, a week or more being required for its completion, depending on the hardness of the wood, and there is an interval before the laying of the first egg (Brewster, 1876b: 65). The same author (1937: 449) stated that often a "supernumerary nest-chamber" is dug, citing an instance where, on robbing one cavity, he found that the next clutch was laid in another believed to have been already dug higher up in the same tree; he pointed out that he knew of no other woodpecker species that did this.

Completed clutches in Maine have contained four to seven eggs. Full sets are to be found from May 15 to June 8 (Knight, 1908b: 279). Among data at hand, the earliest actual record is for six eggs on May 21, 1880, in the Umbagog region [? Me. or N. H. part] (Brewster, 1937: 449). Latest dates are: seven "perfectly fresh" eggs taken in the same region on June 8, 1876 (ibid. 448); and five, slightly incubated, on June 10, 1940, in Penobscot County (Harris). Both sexes take part in incubation (Brewster, 1876b: 65); the period (probably about two weeks) apparently is unrecorded, as is also the time required for fledging. "The young leave the nest in July, and for a long time the brood remains together, being still fed by the parents" (ibid. 69). One brood is raised yearly.

Winter. A single individual was noted through the winter of 1911–12 at Fairfield Center, Somerset County, where it fed, at least partly, on frozen apples (Nye, 1918). The species was reported as having occurred as early as March 8 of unstated year, presumably in the Bangor region, by Knight (1908b: 279). A bird was found dead on March 12, 1923, at Augusta (Mendall). Such early occurrences may indicate wintering, rather than migrating, birds.

Ecology. Although feeding chiefly in deciduous trees at all times, in summer this bird occurs mainly, though by no means exclusively, in mixed growth or hardwoods on low ground, generally near water. For Umbagog, Brewster (1937: 441) wrote that these birds were seen in numbers "where crowded trunks of lifeless trees, in various stages of decay, stretched for miles along flooded shores backed by higher ground covered with verdant and unbroken forest." Similar situations have been brought about at many places in the state in the past by the damming of various waters and the resultant flooding which killed the trees along the shores, but this zone of trees now is too far decayed to

attract many sapsuckers. Because the preferred poplars and yellow birches occur on land flooded by beavers, and this flooding provides trees of all sorts in the early stages of decay, one can generally find sapsuckers about beaver ponds.

The species is well known for its habit of digging rows of pits in trees. It actually eats part of the tree, the cambrium and bast, and consumes sap flowing from the pits. "These holes are placed in rows around the tree, rather closely together, and one row above another so that there are sometimes hundreds or thousands of these small holes in one tree. Apple and pear trees and the mountain ash are the chief garden trees so treated, but they also treat likewise maple, poplar, oak, pine and birch among forest trees" (Knight, 1908b: 280). Insects are eaten at the sap pits. These birds are adept at catching insects on the wing, as described by Brewster (1876b: 69). Elsewhere (p. 329), I have given some data on hummingbirds feeding at sapsucker pits.

Remarks. Knight (1908b: 279) stated that, along the coast, he had found these birds nesting "near the shores of our outer wooded islands in dead spruce stubs." Whereas this may have been the case formerly, it is not so at the present time.

Northern Hairy Woodpecker

Dendrocopos villosus septentrionalis (Nuttall)

No typical specimen reported, but intermediates between this race and typical *villosus* have been referred to it. The largest birds (nearest *septentrionalis*) are *winter visitants* in unknown numbers from farther north.

Remarks. Measurements of two adult males taken in June of unstated year at Sebec Lake, Piscataquis County, were given by Ridgway (1914: 202), who stated (p. 210) that they were "very nearly if not quite as large as some specimens of *D*[*ryobates*] *v. septentrionalis* from the far north, and apparently should be referred to that form." Two birds collected by Brewster, at Lake Umbagog, "Maine," on October 10, 1885 and October 27, 1884, were listed by Griscom (1935: 6) under the heading "Nearest *septentrionalis*." He again referred to them (*in* Brewster, 1937: 420) as "much nearer this subspecies than typical *villosus*." From the dates it would seem that the Sebec Lake birds were breeders and the Umbagog birds probably migrants.

I have at hand five adult males and four females from the collection of the Portland Society of Natural History, taken in Maine from October 9 to February 17. In the males, chord of wing measures 121 to 130, tail 74 to 79, and bill 26 to 31 mm. The largest bird has the

smallest bill. In the females, chord of wing measures 121 to 126, tail 73 to 81, and bill 22.5 to 29 mm. The white spots are fully developed on the inner vanes of the third and fourth primaries of all of these specimens, and there is some variation in size of white spots and bars, especially on the wing-coverts. They are, perhaps, all migrants from outside the state. I do not have comparable summer specimens, but, judging from Ridgway (1914) and Griscom (1935), since the breeding birds are atypical *villosus*, these winter visitants are more so.

In this species there is a north-south cline or character gradient, involving both size and color patterns. There also appears to be an east-west cline in bill size, the eastern birds having smaller bills. Since no specimen appears to have been taken in Maine, that is readily referable to the subspecies *septentrionalis*, the problem of where to draw any arbitrary line in attempting to allocate existing specimens to either subspecies is one needing further study.

Eastern Hairy Woodpecker

Dendrocopos villosus villosus (Linnaeus)

Summer resident, common on some larger islands and in eastern and northern Maine, decreasing to rather rare in southern Cumberland and most of York Counties; migrant and *transient*, the extent of migration and number of birds involved varying considerably from year to year; *winter resident* in variable numbers, usually fairly common throughout. Some birds may be resident and very local in their movements.

Migrations and winter. Useful data for these seasons are scarce, the few available indicating that quite a number of birds arrive in southwestern Maine after the middle of October, and, in some years, they become scarce there in mid-winter. At such times many leave the state and do not reappear until late March and April. The winter population in the state is augmented by arrivals from farther north and east. Spring departure takes place in April, and a few migrants have been seen in the Portland region in early May.

Flight years. In the winters of *1918–19* and *1923–24*, unusually large numbers of these birds appeared in southwestern Maine (Norton).

Breeding. "In Maine they nest sometimes in dead spruce and fir trees" (Bendire, 1895: 49). Usually the nest cavity is dug in a deciduous tree, either alive or dead, and at varying heights from the ground. Knight (1908b: 273–274) stated that he had found nests more often in partly dead limbs than in the trunks, from ten to 40 feet above ground, and that he had observed both sexes excavating. The species nests earlier than its relatives in Maine. All records at hand are for

clutches of three or four eggs, although outside the state, the species occasionally is reported to lay as many as six. Brewster (1937: 418–419) reported on 11 nests in the Umbagog region (including the N. H. part), the earliest date for eggs being for three fresh on May 17, 1880, but he also found young in a nest on the 20th, and another brood on the 21st of the same year. Swain (1901b: 27) found young in a nest on May 23, 1900, at Farmington, Franklin County. Brewster's latest date for eggs was four, about to hatch, on June 5, 1897. Both sexes take part in incubation, which, outside of Maine, has been reported (Burns, 1915: 283) to require 14 days. On June 8, 1924, Norton found well-feathered young in a nest at Georgetown, Sagadahoc County, and Brewster (1937: 418) found the last two young in a nest on June 14, 1880, in the Umbagog region. Bendire (1895: 49) stated that the young of this species remain in the nest about three weeks. One brood is raised yearly.

Ecology. This woodpecker shows a preference for woodlands having a large quantity of mature deciduous trees. Knight (1908b: 272–273) wrote: "In winter they appear in orchards and trees of the towns and cities, doing a good work in exterminating the various injurious insects and their eggs and larvae." At this season also, they show a tendency to associate with the Downy Woodpecker, although, generally speaking the Hairy is neither a social nor gregarious species. It is much shyer than its smaller relative.

Remarks. In size and color characteristics, the breeding birds are not typical of the subspecies *villosus*, but exhibit a trend toward the characters of the larger subspecies *septentrionalis*—a trend which is exhibited in a more marked degree by winter visitant birds. (See Remarks under Northern Hairy Woodpecker.)

Northern Downy Woodpecker

Dendrocopos pubescens medianus (Swainson)

Resident, as a breeding bird common throughout, and in fall and spring subject to movements which usually are rather local in nature. A few probably are winter visitants from farther north and east.

Breeding. The nest cavity is dug in a tree or stub. Dead limbs on living or decaying trees most often are used, the entrance to the nest being from about eight to 40 feet above ground. Old apple trees often are selected. Both birds aid in excavating the cavity and in incubating the three to six (usually four or five) eggs. The earliest record is mention of "eggs, May 19 and 20" on Mt. Desert Island, by Tyson and Bond (1941: 64). A set of five fresh eggs was taken on May

23, 1931, at Kokadjo, Piscataquis County (Harris). For the Umbagog region (including the N. H. part), Brewster (1937: 421–423) gave data on eight sets of three to six eggs, the earliest date being for six, slightly incubated, on May 23, 1896, and the latest for three fresh on June 15, 1876; he found a brood of young, several days old, as early as June 7, 1880. Outside the state, the incubation period has been reported (Burns, 1915: 283) as 12 days. The fledging period (probably about 14 days) apparently is unrecorded. The family group stays together for a while after the young are fledged. One brood is raised yearly.

Ecology. The Downy usually is found in hardwood trees, as is the Hairy, but generally the former feeds, as well as digs its nest, in places where the wood is in a more advanced state of decay than is preferred by its larger relative. When wandering in spring and fall, the Downy is rather social, traveling in company with nuthatches, chickadees, and the Brown Creeper.

Knight (1908b: 276) wrote: "A habit common to both the Downy and Hairy Woodpecker is to excavate in a rotten limb a temporary place of refuge which they use to roost in during the winter, and in Bangor I have observed individuals making such holes in December which they used to roost in during the winter and deserted at the approach of spring."

Remarks. In most years the seasonal movements of the Downy apparently are much more local than those of the Hairy Woodpecker.

On August 2, 1940, Mrs. E. A. Anthony caught one of these birds that had broken a leg, at Bar Harbor on Mt. Desert Island. The leg was bound with adhesive tape and the bird released. It returned daily to feed and, on August 11, was caught again and the wrapping removed Although there was a rather stiff joint, the leg was healed and the bird could use it.

I am not aware that specimens referable to any other than the subspecies *medianus* have been reported for Maine. In the *A. O. U. Check-List* (1931: 197), it is stated that the subspecies *nelsoni* probably occurs eastward to northern New England.

Arctic Three-toed Woodpecker

Picoïdes arcticus (Swainson)

Resident, as a breeder uncommon to rare in coniferous forests in the interior and perhaps nesting very rarely to the coast east of Penobscot Bay; subject to dispersal movements and, rarely, to *incursions* when numbers may be noted several hundred miles outside the breeding range.

Incursions. There is considerable variation in the extent and in numbers of birds involved in dispersal movements. Four incursions have been noted for New England, there being Maine data at hand for only two of these. In *1860–61*, according to Brewster (1883b), an influx was very apparent in eastern Massachusetts in the winter; in *1923*, many appeared in Aroostook County early in October, and the flight was noted that fall or winter as far west as Ontario and south to New Jersey (Van Tyne, 1926); in *1926*, a considerable southward movement occurred in New England in the autumn (Forbush, 1927: 273); in *1942*, there were enough reports for New England to indicate an incursion of small proportions in fall.

Breeding. Nest cavities usually are excavated in the relatively open sections of dead or partly decayed soft-wood trees or stubs, rarely in hardwoods, and usually under 15 feet from the ground. In 1944, Mendall found a nest about 8 feet above ground in a telephone pole beside a well-traveled highway in Waite, Washington County. Knight (1908b: 277) stated that both sexes aid in excavating the nest, and that three to five (usually four) eggs are laid about the last of May. For the Umbagog region (including the N. H. part), Brewster (1937: 426–428) recorded breeding data as follows: a female, which had already started laying, shot on May 14, 1881; four slightly incubated eggs on May 19, 1880; a male found on four eggs that were advanced in incubation on May 27, 1880; three fresh eggs (an incomplete set as was revealed in dissection of the female) on May 30, 1876; and both parents feeding young in the nest on June 4, 1879, the young leaving the nest between June 17 and 21. Samuels (1865: 397) found two nests in June, 1864, on the Magalloway River, about 40 miles above Lake Umbagog; the first, found on the 15th, contained three young apparently about a week old, and the second (day of month unstated) contained three eggs. Chamberlain's notes contain mention of "nests" on July 10, 1918, on the bank of the Fish River, and on July 15, 1923, at Houlton, both in Aroostook County. The incubation period of this species is about 14 days (Bent, 1939: 110), and there appears to be no information on the fledging period. One brood is raised yearly.

Ecology. According to Hardy (*in* Bendire, 1895: 75), this species "is rarely, if ever, found in any numbers far from burnt tracts; if in green growth, usually singly, or at most in pairs; but on newly burnt lands specimens may be found by the score, and their sharp, shrill 'chirk, chirk' can be heard in all directions. It seems to feed entirely on such wood worms as attack spruce, pine, and other soft-wood timber that has been fire-killed." Although 'burns' are favored, especially in the breeding season, Brewster (1937: 424) found that in the Umbagog region the birds frequented wet bottom-lands where there

was a mixture of cedar, larch, and other conifers, in spring and summer. Knight (1908b: 277) stated that, in addition to occurrence in 'burns', this species also could be found in considerable numbers where tracts of timber had been flooded by the raising of the water level and the standing stubs had become "thoroughly infested with various species of woodworking insects, mainly beetles and their larvae." On July 26, 1934, one of these birds was observed working on spruces killed by a bark beetle, in Coburn Gore, Franklin County (A. E. Brower). There is less restriction of habitat in fall and winter than in spring and summer.

Remarks. The limits of seasonal occurrence in Cumberland County are September 16, 1899, at Westbrook, and May 20, 1900, at Gorham (Norton).

Carpenter (1886a: 25) once saw "as many as twenty" in a day, in August or September, 1884, at Tim Pond, Franklin County, and Hardy (*in* Bendire, 1895: 75) stated that, on one occasion, he saw them so numerous in a burned area that he "shot the heads off of six in a few minutes when short of material for a stew."

The species has decreased markedly in numbers during the past 50 years.

American Three-toed Woodpecker

Picoïdes tridactylus bacatus Bangs

Resident, breeding rarely in Oxford, Franklin, Penobscot, and Aroostook Counties, and probably in Somerset, Piscataquis, and the northern parts of Hancock and Washington; subject to dispersal movements but even then usually rare or absent from extreme southwestern Maine; subject to *incursions* very rarely.

Incursions. Maine data include: *1883–84,* beginning in the fall and up to early January, E. S. Bowler, a Bangor taxidermist, received a great many of these birds, over 40 being sent him by one person (Hardy); and in *1941–42,* the species was rather plentiful throughout the state in winter (Norton).

Breeding. Less is known about the breeding habits of the present species than those of the Arctic Three-toed Woodpecker, although apparently they are quite similar.

On May 31, 1947, a nest was being constructed and both male and female were seen at the site, in Eustis, Franklin County (Taber, 1948b: 44). On June 2, 1897, a male was seen to enter a nest, and on the 5th, both parent birds and two eggs were secured, at Bottle Creek Pond in New Hampshire, near Lake Umbagog (Brewster, 1937: 434–439). The nest was in the trunk of a dead spruce, only a few feet

above the ground. On June 9, 1898, a nest was found about 20 feet up in a spruce stub, at B Pond, Upton, Oxford County, and the eggs were taken (Thayer *in* Brewster, 1937: 439); according to information from J. L. Peters, of the Museum of Comparative Zoölogy, the eggs were fresh and two in number, and the female was shot. Chamberlain found a nest located in a telephone pole beside Highway 227, east of Ashland, Aroostook County; though contents were not noted, the male was captured and banded, and the female photographed carrying food into the nest, on June 16, 1934. On authority of Walter Clayton, late taxidermist at Lincoln, Tyson and Bond (1941: 64) stated that this species has been found nesting in Penobscot County.

Data from outside the state indicate that four eggs make a clutch. Bendire (1895: 79) stated that incubation, by both sexes, probably requires 14 days. I find no data on the fledging period or number of broods (probably one yearly).

Ecology. This species is similar to the preceding one in its preference for burned areas and for trees in a certain state of decay, also in being less restricted in habitat during fall and winter than at other seasons. (See Ecology under Arctic Three-toed Woodpecker.)

Remarks. Although usually a scarce bird in summer, 13 specimens were collected from August 15 to September 3, 1895, at King and Bartlett Lake in Somerset County, by Dr. W. E. Hughes. They are in the collection of the Academy of Natural Sciences of Philadelphia.

Like the preceding species, this one also has decreased markedly in numbers in the last 50 years.

The type locality of the subspecies *bacatus* is Bangor (Bangs, 1900: 136).

Family TYRANNIDAE

Eastern Kingbird

Tyrannus tyrannus (Linnaeus)

Summer resident, fairly common throughout, except absent from most islands and rare on others; *transient,* common in spring and fall throughout.

Spring. This bird usually arrives in southwestern counties by May 9, although occasionally earlier and rarely as late as the 15th. The earliest record is for April 22, 1897, at West Bridgton, Cumberland County (Mead *in* Powers, 1897g), and the next is May 1, 1903, at Westbrook in the same county (Norton). It has been noted as early as May 4, 1938, at Lewiston, Androscoggin County (P. A. Wright),

and May 5 of unstated year at Presque Isle (*in* Bent, 1942: 28). Chamberlain's records of arrival at the latter place range from May 6 to 29, averaging about the 22nd. Migration continues throughout May even in southwestern counties.

Fall. Migration occurs mainly from August 15 to September 7, and the species occasionally is seen to the 15th and rarely to the 25th.

Breeding. The nest usually is situated on the limbs of a deciduous tree, in a shaded spot well away from the trunk. Several writers also have noted nests in the hollowed tops of stubs on inundated shores, and in rather low bushes overhanging the banks of ponds and streams. At Lake Umbagog, Brewster (1937: 484) found that some nests in stubs were far enough below the upper rims of the cavities so that the nest or incubating bird was hardly visible, save from above. In early July, 1946, C. R. Mason found a nest, containing four young, on driftwood, 16 inches above water, on the Penobscot West Branch, probably in Township A, Range 12, Piscataquis County. Swain (1901d: 31) reported a nest built on the steps of a martin house at Livermore, Androscoggin County. The nest, which is rather bulky for the size of the bird, is constructed by the female, and usually is made of rootlets, weed stalks, twigs, twine, or, in some localities, mainly *Usnea*, and lined with fine rootlets. Three or four eggs make a clutch. Whereas Knight (1908b: 308) stated that these birds have eggs the first two or three weeks in June, I find that, in about 20 cases at hand, none had a completed clutch before the 10th, and some birds did not start building until after that date. Fresh eggs may be found until about July 10. The female does the incubating. "The incubation period is thirteen days, and the young are able to leave the nest fifteen days after they are hatched" (ibid.). One brood is raised yearly.

Ecology. This is a bird of orchards, roadside trees, and open borders of farmlands, of alder bushes along the shores, and of dead limbs of trees standing in water in both agricultural and forested lands throughout the state. When there are unfledged young, the adults, on cleaning the nest, often drop the fecal matter in water and then wash their bills. The belligerent behavior of both sexes in driving away crows and hawks, and of the male in driving many smaller birds, is a prominent characteristic of this flycatcher. The species is not gregarious.

Remarks. Knight (ibid.) pointed out that this species eats various insects, including bees, also fruits and berries of various kinds. I have observed them eating wild cherries several times, and Dr. Anne Perkins has seen them eat blueberries.

Josselyn (1674; 1865b: 76) wrote of a "little black *hawke* highly prized by the *Indians* who wear them on their heads, and is accounted of worth sufficient to ransome a *Sagamour*: they are so strangely

courageous and hardie, that nothing flyeth in the Air that they will not bind with."

The number of summer resident Kingbirds has been decreasing gradually for 20 years, if not longer.

Northern Gray Kingbird

Tyrannus dominicensis dominicensis (Gmelin)

Hypothetical. Two were reported seen by Martin Curtler on September 14, 1938, at the southwestern end of Deer Isle, Hancock County (Sprunt *in* Bent, 1942: 47–48).

Lichtenstein's Tropical Kingbird

Tyrannus melancholicus chloronotus Berlepsch

One specimen. An immature male, probably a hurricane visitant, was collected on October 31, 1915, at Scarborough, and is in the collection of the Portland Society of Natural History (Norton, 1916: 382).

Remarks. Although first recorded under the subspecific name *satrapa,* it subsequently was referred to *chloronotus* by Friedmann (Slipp, 1942: 311).

Western Kingbird; Arkansas Kingbird

Tyrannus verticalis Say

Occasional *visitant,* usually on or near the coast, from early fall to early winter.

Records. The only record before 1920 (see Remarks) is for a bird of the year collected in October, 1864, at "Plympton" [=Eliot, York County], and recorded by Bryant (1865), the locality being corrected by Purdie (1876: 73).

On July 7, 1937, a freshly killed male was found on Machias Seal Island (Pettingill, 1939a: 352), this place being Canadian territory but within the scope of the present paper (see p. 11). All other records at hand are: one seen on August 25, 1925, at Cutts Island, Kittery, York County (Townsend, 1926); one seen on September 1, 1936, on Matinicus Island, Knox County (Kuschke, 1937); one seen on September 10, 1934, at Somesville on Mt. Desert Island (Tousey *in* Low, 1934: 369); one seen on October 5, 1943, at Harrison, Cumberland County (Mrs. F. Lowe); one collected on October 10, 1940, at Webster, Androscoggin County (Francis Jones); two seen on October 25 and

to the 30th, 1939, at Orono, Penobscot County (Beaton, 1940); one seen on November 1, 1946, at Schoodic Point, Hancock County (Mrs. H. Mann, 1947); an immature male collected on November 3, 1935, at Biddeford Pool, York County (Robbins, 1936); one collected on November 23, 1925, at Woolwich, Sagadahoc County (Haven, 1926a); one seen on December 6, 1925, at Saco, York County (Abbott, 1926: 166); and one seen from November 12, 1920 to January 15, 1921, at Hallowell, Kennebec County (C. Miller, 1921: 603).

Remarks. In the past three decades, quite a few individuals have come eastward after the breeding season, so that the species is reported regularly in New England in fall.

Southern Fork-tailed Flycatcher

Muscivora tyrannus tyrannus (Linnaeus)

One specimen was taken at Marion, Washington County, on December 1, 1908 (Knight, 1910c). It was examined in the New England Museum of Natural History at Boston, and its subspecific identity checked by Bond (1940: 419).

Scissor-tailed Flycatcher

Muscivora forficata (Gmelin)

Hypothetical. While on Matinicus Island, Knox County, in October and November, 1915, W. L. McAtee had described to him a bird that had occurred on the island both in 1914 and 1915, the descriptions leaving no doubt in his mind that the present species was the one seen. In the latter year, a bird remained near one house for over a week. A. Kuschke (1937) wrote: "It is interesting to note that Ernest Young of Matinicus says that he and a few others saw a Scissor-tailed Flycatcher . . . there in June, 1936. Mr. Young says it was observed for several hours, and he accurately describes the snapping of the scissor-tail." There is a sight record for October 20, 1939, at Portland, by Gertrude Reeves.

Remarks. This species has been captured in the Province of Quebec, as well as on both the New Brunswick mainland and the island of Grand Manan.

Northern Crested Flycatcher

Myiarchus crinitus boreus Bangs

Summer resident, uncommon but regular inland from the coast to about forty miles in the southern half of the state from the Penobscot

drainage westward, and rare elsewhere, especially in northern and eastern Maine; occurs on islands very rarely except in migrations.

Spring. This species usually arrives in southwestern Maine about May 17, and occasionally by the 12th. The earliest satisfactory records are for Avon, Franklin County, on May 7, 1910 (Sweet 1911b: 64), and on May 8, 1902 (Sweet, 1904c: 78). It was noted as early as May 9, 1896, at Orono, Penobscot County (Knight *in* E. H. Norton, 1902). Migration continues to at least the end of May.

Fall. Migration begins by August 10 or earlier and, judging from the few data at hand, occurs chiefly in the remainder of that month. Knight (1908b: 310) stated that the species sometimes was present until September 20, but the only record for that month at hand, other than for the 1st, is September 13 of unstated year at Winthrop, Kennebec County, as given in Bent (1942: 121). Occurrence of a single bird on October 12 and 21, 1918, on Monhegan, as reported by Wentworth (*in* Jenney, 1919: 27) seems an acceptable record, since individuals of various flycatcher species occasionally linger very late.

Breeding. The nest is either in a natural cavity or an old cavity dug by one of the larger woodpeckers, and at various heights from the ground, in a live tree or dead stub. Apple trees are selected on cultivated lands, and a variety of wild species elsewhere. A bulky nest, of leaves, hair, string, shed snake skins, and an assortment of litter, is built in the cavity and, generally, lined with feathers. Four to eight (usually five or six) eggs are laid (Knight, 1908b: 311). Sweet (1904a) gave the following data on a nest in an apple tree, in 1904, at Avon: May 28, nest under construction; June 7, nest had snake skins added and was lined with hen feathers; June 11, three eggs; and June 30, feeding young. In the Umbagog region, Brewster (1937: 486–487) saw a bird collecting bark and shreds of decayed woods on June 8, 1897, and he collected a set of five slightly incubated eggs from a nest, in an isolated stub standing in water, on June 9, 1880. Knight (op. cit.) reported that six eggs were taken from a nest of dried leaves and feathers in the broken top of a tree on June 25, 1891, at Pittsfield, Somerset County. He gave the incubation period as 14 days (ibid.), but outside the state, other writers have reported it as 13 and 15; he also gave the fledging period as about 18 days, but others, elsewhere, have stated that it is both shorter and longer. The family group stays together for a while after the young are fledged. One brood is raised yearly.

Ecology. From personal experience, I consider this bird to be an inhabitant of mature hardwoods on low ground near water, with food gathered in and below the crowns of trees about as often as it is secured by flying out into the open. Yet other persons associate the

species mainly with orchards on uplands. Not infrequently, several pairs may be found nesting along a quarter mile stretch of river bank or lake shore, and no more for a considerable distance, perhaps indicating a tendency toward colonial nesting in this species.

Remarks. Available data indicate that these birds have not altered their distribution in the state noticeably since the first records of them. There have been marked local fluctuations from year to year and possibly some general decline in numbers over the past 20 years. If such is the case, this trend will continue if Starlings compete successfully for the available nesting cavities.

Mention of occurrence on April 14, 1910, at Ellsworth, Hancock County (*in* Sweet, 1911b: 64) probably was a typographical error.

Eastern Phoebe

Sayornis phoebe (Latham)

Summer resident, of uneven distribution, but, generally, fairly common in settled sections of the mainland, decreasing to uncommon in eastern Washington and northern Aroostook Counties, and rare or absent from most islands and from extensive areas of forest; *transient,* common in spring and fall in settled sections and on islands, and rather rare in forested areas; one *winter* record.

Spring. The Phoebe usually arrives in southwestern counties by April 5, and throughout by the 25th. Early occurrences are: March 17, 1852, at Steuben, Washington County (*in* Hough, 1864: 204); March 19, 1903 (Swain, 1903: 19), at Solon, Somerset County; five March 22 dates for north into Oxford and east into Hancock Counties; four March 24 dates for points east to Brewer; and quite a few later March dates for about the same area. Chamberlain's earliest date for Presque Isle is March 16. Migration usually reaches its peak by April 12, and ends by May 1, in southwestern Maine.

Fall. Migration occurs throughout September, and the number of birds diminishes rapidly thereafter, with scattered records to October 16. Late dates are: October 18, 1941, at Scarborough (Norton); October 19, 1895, in southwestern Maine (*in* W. Cooke, 1908c: 211); October 19, 1944, at Friendship, Knox County (Mrs. P. Hannemann); and November 23, 1884, at Brewer, when there was six inches of snow on the ground (Hardy, 1885).

Breeding and summer. "They seem with us to prefer the region adjacent to water and usually can be found about a majority of the bridges and large culverts, only a pair to a given locality. . . . The nests are placed against beams and stone walls of culverts, on beams

and similar situations under bridges . . . or in out buildings, the same place being reoccupied year after year" (Knight, 1908b: 312–313). Other sites have been reported: under the shelving upturned roots of a tree in Franklin County (Carpenter, 1886b: 162); in the hollowed side of a stump on a river bank in Cumberland County (Norton); in quarries (several observers); between shelves of rock along a small stream (Lane, 1899: 30); in rocky ravines and about waterfalls, chiefly in western Maine (several observers); and on a little projection on the side of a freshly cut dirt road bank, and on a shelf of sand on the side of a sand pit under a canopy of overhanging roots and turf, both in Cumberland County (Norton). The species characteristically builds as close up under a projecting overhead shelter as can be done conveniently, building a new nest on top of an old one or nearby.

Nests are of mud, rootlets, moss, and lichens intermingled, and lined with fine rootlets or grass and feathers. They are flattened when against a wall or ledge, and circular when on a beam or elsewhere not up against a vertical surface. "Nest building requires about thirteen days, though I have known exceptionally of a nest being built in seven days. . . An egg is laid each day until the set is complete. Three to eight, usually five pure white eggs are laid" (Knight, 1908b: 313). Gross found a completed nest at Brunswick, Cumberland County, as early as April 10, 1945. A pair was beginning to build at Brewer on April 12, 1882 (Hardy). On April 19, 1910, one was seen carrying nesting material at Westbrook, Cumberland County, and there were two eggs in the nest on May 1 (Norton). Full clutches have been reported from May 7 on, and may be expected regularly by the 12th.

According to Knight (ibid.), the male aids in incubation. This needs confirmation from other observers. He gave the incubation period as 13 days, but outside the state, although reports indicate a variation, 16 days have been given as about average. Knight also gave 16 days as the fledging period, and this is in close agreement with the findings of others. Both sexes feed the young. A new nest is made, and eggs for the second brood usually are laid in the latter half of June.

Some birds on islands may be visitants or non-breeding residents in summer. Most, if not all, of the birds on Mt. Desert Island appear to be unmated (Bond *in* Tyson and Bond, 1941: 64).

Winter. This species was listed as occurring on February 17, 1857, at Naples, Cumberland County (*in* Hough, 1864: 204). Since a few birds winter quite often in southern New England, and even have been seen rarely in the latitude of southern Maine, the report in Hough is acceptable.

Ecology. The Phoebe shows a decided preference for sheltered places, whether about buildings remote from water, or along rocky walls of

streams or about bridges. The birds fly out in the open to catch insects on the wing, usually feeding under 25 feet altitude over ground or water. In migration it occurs about the edges of rather open deciduous woodlands.

Remarks. Williamson (1832: 143) stated that this bird laid its eggs in the nests of swallows. Probably this statement was the basis for Audubon (1834: 129) writing, "Instances of their taking possession of the nest of the Republican [=Cliff] Swallow . . . have been observed in the State of Maine."

A. E. Verrill (1862a: 144) was in error in stating that this bird was seen often as early as the first of March at Norway, Oxford County.

Yellow-bellied Flycatcher

Empidonax flaviventris (Baird and Baird)

Summer resident, fairly common in coniferous forests from southern Oxford, Franklin, Somerset, Penobscot, and Hancock Counties north and east (includes islands east of Penobscot Bay), and rare and local elsewhere; *transient,* common in spring and fall.

Spring. The average arrival date for six years in "southern Maine" was May 26 (*in* W. Cooke, 1908a: 114). The bird is rarely seen earlier than May 22, the earliest date for the state being May 13, 1909, at Farmington, Franklin County (Swain *in* Legge, 1910b: 52). Migration continues into June. On June 13 and 14, 1947, two or more were seen on offshore Machias Seal Island (Canadian territory) by O. Hawksley, which were, perhaps, very late migrants.

Fall. Migration occurs chiefly in the latter half of August and the first week of September. There are several September 8 dates and these later ones: September 10, 1936, at Jackman, Somerset County (M. R. Lindauer); and September 21 of unstated year at Portland (*in* Bent, 1942: 183).

Breeding. "The nest is situated on the ground at the foot of a bush or hummock and imbedded in the reeking sphagnum moss of the deep woods or sometimes in the upturned mossy roots of a fallen tree in a similar locality. The nest is composed of moss lined with black hair-like roots. Four or five eggs are laid" (Knight, 1908b: 318). Egg dates for Maine (*in* Bent, 1942: 183) range from June 1 to July 12 for 11 records. Most of the following specific data apply to rather exceptional nests in that they were not on the ground. The first nest and eggs (four fresh) of this species, taken June 18, 1878, at Houlton, Aroostook County, was described by Purdie (1878: 167). The nest, located amidst black mud clinging to the roots of an upturned tree, was about two feet from the ground, and made of moss, with a lining of black

rootlets, a few pine needles, and stems of grass. Batchelder (1879) described two nests, found at Fort Fairfield in the same county, as follows: on June 14, 1879, one nest, containing four fresh eggs, was found in a bank formed by a decayed tree trunk over a pool, in mixed woods; and on June 27, a nest, containing four slightly incubated eggs, was found about two feet above ground, sunk in the moss on the side of a stump. Eddy (1880) found four eggs on June 13, 1880, at Little Deer Isle, Hancock County, in a nest on a large root forming a shelf under a stump. Three eggs advanced in incubation were found on July 3, 1941, on Mt. Desert Island (R. F. Miller, 1941: 135); this was at Seawall Bog in the town of Tremont. In general, it appears that nests are placed in moss or other vegetation in banks or similar places, being raised above the wettest part of the terrain. From data outside of Maine, Forbush (1927: 350) stated that the incubation period is 12 to 14 days. Apparently, there are no data on the fledging period or number of broods per year.

Ecology. This is a bird of dense, wet coniferous woodlands, or mixed conifers, birches, alders, and some heaths, where the shaded ground is carpeted with *Sphagnum*. One associates the bird with very wet ground and pools of quiet water in dense swamps, although occasionally it has been found fairly high up on several of the larger mountains of the state, in conifers or a mixture of conifers and heaths where the ground is quite dry yet largely mossy. In migration it is largely restricted to swampy places, including those grown chiefly to alders and young birches.

Remarks. The reader is referred to Forbush (1927: opp. p. 352) for excellent photographs of a nest in its natural setting and of juvenal birds. These were taken by Miss Stanwood in the vicinity of Ellsworth, Hancock County.

Alder Traill's Flycatcher

Empidonax traillii traillii (Audubon)

Summer resident, common to rather numerous in northern and eastern sections (including islands), but decreasing to uncommon in southwestern Maine; *transient,* common in spring and fall throughout.

Spring. This species generally arrives in southwestern Maine by May 18 and is found throughout by the 23rd. Early dates of occurrence are: May 10, 1910, at Farmington, Franklin County (Swain *in* Sweet, 1911b: 64); May 11, 1930, in Albany Township, Oxford County (Norton); and May 14, 1942, at Brewer (Weston). Chamberlain's earliest date for Presque Isle is May 21. Migration continues into the first week in June in southwestern Maine.

Fall. Migration occurs mainly in the first 25 days of August, with a few records to September 5, there being two records for this date. Later reports are for birds seen and not heard, hence are doubtful.

Breeding. "Nests of the Alder Flycatcher found in the Umbagog Region [of Me. and N. H.] are always loosely constructed of grasses and wood-stalks throughout, including the lining. They are usually placed at no great height above the ground among slender, upright forks, or shoots of bushes and sapling trees" (Brewster, 1937: 496–497). These statements apply to the species throughout Maine.

"The nest is usually finished within ten days from its beginning, an egg is laid each day, and incubation begins at once" (Knight, 1908b: 320). Clutches consist of three or four eggs. Bent (1942: 213) stated that there were 20 Maine records for May 15 to July 1, ten being in the period from June 16 to 22. "The incubation period is twelve days and the young leave the nest about thirteen days after they are hatched. The female does all the nest building and incubating, but the male . . . when the young are hatched helps to feed them" (Knight, op. cit.). Miss Stanwood (1910a: 4) was in close agreement as regards incubation and fledging periods. Probably a single brood is raised yearly.

Ecology. Knight (1908b: 319) stated that the species is common in such places as "bushy alder thickets by the roadsides and along streams and about ponds, being found almost anywhere that the suitable low bushy thickets occur." I associate the species mainly with abandoned damp fields or cut-over woodlots that are growing up to alders, the clumps of which are small and somewhat scattered, rather than dense and mature. In the case of dense stands, this flycatcher frequents the edges, where it perches or seeks its prey usually not more than a few feet from the ground. Dry fields having clumps of deciduous bushes also are favored places in summer. The same sort of bushy habitat is preferred in migration.

Remarks. Knight (ibid. 320) stated that, in addition to the usual fare of insects, this species occasionally eats cherries (*Prunus pensylvanica*).

The reader is referred to Brewster (1937: 495–496) for a detailed discussion of the voice of this bird.

Least Flycatcher

Empidonax minimus (Baird and Baird)

Summer resident, common in western Maine, but decreasing to somewhat uncommon in the eastern and northern sections; *transient,* fairly common in spring and fall throughout.

Spring. This species usually arrives in southwestern Maine from May 2 to 5, but has been noted by the latter date at points farther north and east. Early dates are: April 20, 1931, at Falmouth, Cumberland County (Rich); April 21, 1902, at Livermore, Androscoggin County (Briggs *in* Sweet, 1904c: 78); April 24, 1909, at Brunswick, Cumberland County (Pope *in* Legge, 1910a: 37); several records for southwestern counties for April 27 to 30; May 2, 1896, at Orono, Penobscot County (Knight *in* E. H. Norton, 1902); and May 3, 1904, at Skowhegan, Somerset County (Swain *in* Sweet, 1905c: 62). This bird may be expected about May 14 at Brewer, and May 17 at Presque Isle. Chamberlain's earliest date for the latter place is May 11. Perhaps migration continues into early June, for Spinney (1903b: 54) saw migrants on the light at Seguin as late as June 5, 1897.

Fall. Migration begins by August 5 and occurs mainly in the rest of that month, with a few records for the first half of September. The species has been noted as late as September 14, 1937, at Jackman, Somerset County (A. R. Phillips); September 19, 1945, at Cape Rosier, Hancock County (R. and M. Emery); September 23, 1905, at Portland (Eastman *in* Brownson, 1906c: 63); and September 30 of unstated year at Phillips, Franklin County (*in* Bent, 1942: 278). There are reports to October 25, but these are for *Empidonax* flycatchers doubtfully identified as to species.

Breeding. Knight (1908b: 321) stated that the nest often was placed in an apple or other orchard tree at heights from ten to 15 feet, or in maples at 30 to 40 feet, and in other hardwood trees. In the Umbagog region, Brewster (1937: 498) found that this bird usually built in balsams, hemlocks, or other evergreens, and put more feathers in the linings than he had found to be the case in Massachusetts. The nest may be saddled to a horizontal branch or crotch, or, rarely, where a limb joins the trunk, usually in a rather open and fairly well lighted section, and, according to Knight (op. cit.), is "composed of fine silken weed fibers, cedar bark, willow down, thread, twine and hair."

Records at hand are for clutches of three to six eggs. Knight (1908b: 321) stated that eggs were laid in the "middle portion of June," probably indicating the height of the season. The earliest date is for a nest, mentioned by Swain (1902d: 58), with three eggs in late May in Franklin County. A new, and inaccessible, nest was noted 40 feet up in the top of a slender birch, at Andover, Oxford County, on June 6, 1933 (R. F. Miller); on June 7, 1891, Norton found a nest with four eggs at Westbrook, Cumberland County; and on June 10, 1893, a nest and six eggs were found at Saco, York County (Goodale, 1893). "The incubation period is twelve days and the young leave in about thirteen days after hatching" (Knight, 1908b: 322). On unstated date in

August, 1904, four young were found (three left the nest when it was disturbed) in Washington County (Clark, 1905b). Perhaps rarely a second brood is raised.

Ecology. Before the land was cleared and settled, the preferred habitat of this species appears to have been edges of coniferous forests and any fairly open second-growth deciduous trees. On cultivated lands these birds are found in orchards and shade trees, the edges of groves or timber lots, or abandoned fields where birches and poplars have grown to a height of 15 feet or more. A trend toward utilizing shade trees near dwellings as nesting sites was apparently still in progress at the time Hardy (1881) stated that the species had increased, but seldom was seen far from houses, in the Bangor-Brewer region.

Remarks. The population appears to have been about the same for several decades.

Eastern Wood Pewee

Contopus virens (Linnaeus)

Summer resident, uncommon but regular throughout on the mainland, except rare in areas of relatively unbroken forest and rather rare on some of the larger islands; *transient,* fairly common in spring and fall throughout.

Spring. The Wood Pewee usually arrives in southwestern Maine about May 21, and occurs throughout by the 28th. Since May 14 and 15 reports are very rare, the one for May 12, 1896, at Gardiner, Kennebec County, by Lee (*in* E. H. Norton, 1902), seems doubtful. The species has been seen on May 21 in different years in the Bangor region, and Chamberlain has seen it at Presque Isle on the 23rd. Migration continues into early June.

Fall. Migration occurs mainly from about August 8 to September 3, with a few records to the 15th. Later dates are: September 26, 1939, at Scarborough (Norton); September 27, 1898, in southwestern Maine (*in* W. Cooke, 1908b: 169); October 1, 1899, at Upton, Oxford County (Brewster, 1937: 492); and October 3 of unstated year at Brunswick, Cumberland County (Walch, 1926: 57).

Breeding. "The nest is saddled on a limb of some hardwood tree such as an elm or maple in the city streets, an oak, beech or maple in the forests, generally at a height of forty to fifty feet, while it also nests commonly in orchards, placing the nest in apple trees at from ten to fifteen feet elevation" (Knight, 1908b: 316). The nest, which is small for the size of the bird, is made of grasses, lichens, and similar plant materials, with a lining usually of fine grass or plant fibers and, having an outside covering of lichens, is well camouflaged.

Apparently most clutches, three or four eggs, are completed in the latter half of June. The earliest date is indicated by young found by Norton, at Westbrook, Cumberland County, on June 21, 1925. The next earliest is for three fresh eggs on June 10, 1895, at Orono, Penobscot County (Knight, ibid. 317). One nest contained young on August 11, 1891, at Westbrook (Norton), and another on August 12, 1899, at North Bridgton in the same county (Mead, 1899). According to Knight (op. cit.), the incubation period is 13 days and the fledging period 18. The observations of other persons outside the state would indicate that the latter figure is two or three days too long. Perhaps rarely a second brood is raised the same season.

Ecology. This is a bird of open hardwoods, in either dry or moist situations. It perches in sheltered shady places in the lower parts of the crowns of trees and flits downward to or near the ground to gather insects for food. It also occurs in shade trees about buildings, in orchards, and in stands of fairly mature pines. In migration it occurs almost anywhere in deciduous trees.

Remarks. Various conflicting statements have been published regarding the population of this bird in Maine. According to available data, the Pewee never equalled the Phoebe's numbers, but it was more plentiful as a breeder in the preceding century than it is at present. Whereas the summer population fluctuates noticeably from year to year, 1938 for example being one of markedly increased numbers, the general trend seems to be one of very gradual decrease.

Reported occurrences of this bird on April 14, 1887 in Cumberland County (Black Spot, 1887), and on May 6, 1910, at Farmington, Franklin County (Marden *in* Sweet, 1911b: 64), are undoubtedly erroneous.

Olive-sided Flycatcher

Nuttallornis borealis (Swainson)

Summer resident, rather common in coniferous forests throughout, including marine islands; *transient,* fairly common in spring and fall throughout.

Spring. Arrival dates for southwestern Maine are mostly for May 20 to 24, the majority of earlier dates being for localities farther north or east. Early dates are: a specimen taken on May 7, 1897, in the vicinity of Lewiston, Androscoggin County (Johnson, 1900b); May 10, 1904, at Skowhegan, Somerset County (Swain *in* Sweet, 1905c: 62); May 14, 1905, at Avon, Franklin County (Sweet, 1906b: 37); May 15 occurrences for Skowhegan and Avon; May 16, 1947, at Orono, Pe-

nobscot County (F. Dean); May 17, 1947, at Big Lyford Pond, Township A, Range 12, Piscataquis County (Mrs. I. Sherman); and May 19, 1906, at Castine, Hancock County (Ridley *in* Brownson, 1907c: 38). May 29 is Chamberlain's earliest date for Presque Isle. The duration of migration is not known.

Fall. Migration occurs mainly from August 14 to September 3. Later dates are: September 11, 1902, at Windham, Cumberland County (Norton); September 13 of unstated year at Winthrop, Kennebec County (*in* Bent, 1942: 301); and occasionally lingering until September 15, according to Knight (1908b: 314).

Breeding. The nest is saddled onto a horizontal limb of a conifer (very rarely a deciduous) tree, usually well out from the trunk and more than 20 feet above ground. Five nests with eggs and one new nest, found by Brewster (1937: 490–491) in the Umbagog region, were all in red spruces. Knight (1908b: 315) wrote: "The nest is a beautiful compact structure of moss, lichens, *Usnea* and *Evernea,* lined with fine black rootlets and generally covered exteriorly with small lichens so that when viewed from below it resembles a knot on a limb. Generally three, but occasionally four or only two eggs are laid." Most clutches are completed before the end of June. Bent (1942: 302) stated that there were 13 Maine records for eggs ranging from June 12 to July 26. All other dates at hand fall within this period, except for a nest and eggs, mentioned by Tyson and Bond (1941: 65), on June 2 on Mt. Desert Island. Outside the state, Bendire (1895: 285) reported that incubation required not over 14 days and fledging about three weeks. A single brood, cared for by both parents, is raised yearly.

Ecology. This bird is found where mature conifers are either the chief element, or a conspicuous one, in woodlands—preferably where such trees are rather openly spaced and have dead lower limbs. If the stand of conifers is dense, the birds frequent the edges. A favorite perch is high up in a tree killed by fire or insects, at the edge of a forest clearing, or in a swamp or bog. In former times, when forest clearings were made by removing the smaller trees and girdling the larger ones, the latter were favored perching places (Maynard, 1881: 177). This species feeds higher above ground than does any other member of the flycatcher family occurring regularly in the state.

Remarks. It has been stated that this species is abundant in some Maine localities. In my experience, however, only a few pairs of these noisy and conspicuous birds need be present to give an exaggerated impression of numbers.

It may be of interest that Norton's first published paper (1890) dealt with the nesting of this species at Westbrook.

Family ALAUDIDAE

Northern Horned Lark

Eremophila alpestris alpestris (Linnaeus)

Winter resident, varying in different years from uncommon to numerous coastwise and on islands, and in lesser numbers inland; *transient*, in spring uncommon to fairly common throughout, and in fall common to abundant and chiefly coastwise.

Fall. Migration occurs mainly from October 10 to November 15. Of the few earlier records, two are for September 25 as follows: in 1897, one was shot at Milo, Piscataquis County (Knight, 1898d); and in 1934, one was seen at Scarborough (Norton). There is also a record of one shot on the 25th, in 1896, in the New Hampshire part of the Umbagog region (Brewster, 1937: 499). Spinney's journal, kept while he was on Seguin, reveals that for many days in some seasons, migratory flocks were seen flying in a westerly direction. He stated in a published article (Spinney, 1906a: 49): "Of the eleven seasons I have passed on Seguin the past one [fall, 1905] is the first that hundreds, and I might say thousands, of Shore Larks have not passed over the island . . . The past fall I have not seen fifty Larks, and but one on the ground."

Spring. The wintering population is augmented by arrivals from southwesterly points beginning very early in March, and migration out of the state apparently starts about the same time, with the last birds usually gone by April 22. Apparently most of the migrants go inland, following no obvious route, and rarely does a noticeable flight pass along any section of the coast. A specimen taken the first week in May, 1897, at Monson, Piscataquis County, and recorded by Knight (1897c: 373), is the latest acceptable record for spring.

Winter. Although fluctuating markedly from year to year, the number of birds present is, perhaps, always greater in December and January, with occurrence chiefly along the coast and on islands rather than inland. The flocks vary in size on arrival, but often break up into smaller ones so that usually, on a given stretch of beach or shore, a number of these may be seen.

Ecology. The winter habitat as given for the Prairie subspecies applies to the Northern Horned Lark as well. The latter, however, is found more often on beaches and shores, especially along the line of debris above high tide mark, and, I believe, feeds quite often in places where there is slightly more vegetation than ordinarily is selected by the Prairie Horned Lark. Both subspecies exhibit the same degree of

gregariousness and sociability. (See Ecology under Prairie Horned Lark.)

Remarks. Knight's various published statements were somewhat in conflict as regards the status of this subspecies inland in winter and spring. Probably closest to the facts was his last one (1908b: 323) in which he indicated that numbers inland increased as the winter wore on, which perhaps would imply a northward drifting of these birds from coastal areas.

Three birds which Norton shot on March 11, 1911, at Scarborough, had eaten seeds of eel grass (*Zostera marina*).

Although it is possible that this subspecies occurs in summer, and there is need for collecting and examining breeding birds, the few existing summer and early fall reports (one published) are all unsatisfactory.

Prairie Horned Lark

Eremophila alpestris praticola (Henshaw)

Summer resident, occasional in southern Maine and, varying from year to year, uncommon to fairly common in settled areas in the northern third of the state; *transient,* varying in different years from uncommon to numerous in spring and fall; occasional *winter resident,* reported from widely scattered localities.

Spring. In different years sizeable flocks first have been noted from February 21 to March 6 at widely scattered points. The earliest specimen record is for one taken on February 26, 1897, near Lewiston, Androscoggin County (Knight, 1897c: 374). Migration reaches its peak the second week in March, is conspicuous throughout the month, and wanes in the first 17 days of April. There are records of flocks to May 4.

Fall. Migration begins by mid-September, but occurs chiefly throughout October and the first third of November, with a few sight records to November 26.

Flight year. In *1909,* many flocks, some containing several hundred birds, were observed in March in Cumberland County; in his notes, Norton stated that the flocks were of "immense" size.

Breeding and summer. "The nests are built on the ground, in a grass field or among the weeds of pastures and cultivated farm lands, usually situated in a slight hollow [dug by the female] at the foot of a bunch of grass or weeds. A typical nest before me is composed of grass blades and a few weed fibers" (Knight, 1908b: 325). The several nests which I have observed outside the state have had the characteristic 'platform' on one side, made of pieces of hard earth, chips, and

other debris. Four eggs usually make a clutch. On April 8, 1903, a nest contained half-grown young, at Manchester, Kennebec County (E. C. Pope). On April 23, 1901, nest building was observed at Pishon's Ferry, Clinton, Kennebec County, and on May 14 the nest contained four eggs about a third incubated (Swain, 1901d: 30). On May 31, 1906, a nest with four eggs was found near Weeks Mills, China, Kennebec County (Knight, 1908b: 325). On June 22, 1903, at Errol, New Hampshire, not far from the Maine border, a nest was found that contained an egg and two newly hatched young (G. M. Allen, 1903: 124).

Outside of Maine, it has been found that incubation, by the female, requires 11 days (Pickwell, 1931: 84); the male helps feed the young, and they usually leave the nest on the tenth or eleventh day, some three or four days before they are able to fly (ibid. 93, 112). Probably several broods are raised, with the parents changing sites or territories between some of the broods.

Adults have been noted in pairs, although nests were not found, as late as the second week of August. On the other hand, flocks of up to 25 birds (mainly adults) have been noted in the last third of July. Thus it would seem that the breeding season is more prolonged in some years or with some individuals than others.

Winter. So far as I can find, there are no specimens definitely known to have been taken in December, January, or early February, and, in fact, no records of any sort for December. There are acceptable sight records (by Norton, Mendall, and others), usually of one to five birds, at both inland and coastal localities, from early January on. In some cases the birds were by themselves, and in others, they were with Northern Horned Larks.

Ecology. In summer these birds are found in open expanses where there is very little or no vegetation, as on ploughed fields, golf courses, beaches and shores, rather barren places on mountains, and recently, where airports were under construction or finished. A large field may have several nesting pairs while nearby ones that appear equally suitable will have none. In winter they occur in open places, especially in old gardens where stalks of pigweed rise above the snow. Other places where they can find suitable seeds are hay fields, salt marshes, beaches, and where grain or chaff has been scattered about near buildings or in roads. This lark is gregarious and social, common associates in diminishing order of frequency being Northern Horned Larks, Snow Buntings, and Lapland Longspurs.

Remarks. It generally is believed, on much evidence, that this paler prairie subspecies of the horned lark spread eastward, extending its range greatly after about 1884. A number of authors have written at

length on this subject, pointing out that the clearing of the land, followed by agricultural and other practices, provided suitable nesting sites in the northeast. Norton (1906a) attempted to discredit this belief, implying that the species had occurred for a long time but had been overlooked. Townsend and Allen (1907: 383–384) discussed his arguments and showed rather conclusively that they were untenable.

The first Maine records of this race were two specimens, recorded by Knight (1897c: 372), taken "in the winter of 1886 or 1887," at Bucksport, Hancock County, and an adult male taken on March 30, 1887, at Bangor. Quite a few specimens were taken by various collectors, including Norton, in the 1890's, all that were recorded or that I have seen having been captured in spring.

Knight (1908b: 325) stated that, in winter, these birds "consume large amounts of weed seeds such as *Rumex, Polygonum, Chenopodium, Ambrosia, Setaria* and other grass and weed seeds, as well as what they can glean from the horse droppings in the highway. In the summer they take large quantities of insects such as beetles, grasshoppers, crickets, moths, worms and caterpillars. I have seen them take on the wing small moths which they flushed from the grass and caught much as a Flycatcher would."

In giving county records, Knight (ibid. 324) placed Pishon's Ferry in the wrong county.

Family HIRUNDINIDAE

Tree Swallow

Iridoprocne bicolor (Vieillot)

Summer resident, common to numerous throughout, including islands; *transient,* numerous in spring and fall.

Spring. Although there is great variation in arrival dates, this species generally is present at points in southern Maine east to Penobscot Bay by April 12. Early dates of occurrence are: three seen on March 15, 1930, at Deering, Cumberland County (Norton); March 19, 1894, at Lewiston, Androscoggin County (E. Johnson, 1900a: 10); March 22, 1901, at Popham Beach, Sagadahoc County (Spinney); March 27 of unstated year at Ellsworth, Hancock County (*in* Bent, 1942: 399); March 29, 1936, at Brunswick, Cumberland County (Gross); and March 31, 1902, at Portland (Norton). April 13 is Chamberlain's earliest date for Presque Isle, where he generally has found the species to arrive from April 18 into early May in different years. Usually these swallows are present in some numbers throughout a large part of the state by April 17 to 30, and common throughout a week later.

Fall. As soon as the young are fledged, many birds leave the nesting territory and gather in flocks at suitable feeding places. The duration of premigration wandering and flocking at roosts varies considerably in different years, apparently because of weather and/or food conditions. In some years there is a definite migratory movement before mid-July, and in others it is not noticeable until later in the month. Most birds have departed by August 17, although small flocks have been seen until the middle of September. This species was noted as late as October 9, 1888, in the Umbagog region (Brewster *in* Griscom, 1938: 553), and two later records are: seven seen and some of them collected on October 16, 1894, at Scarborough (Norton); and mention of occurrence on October 20 of unstated year at Lewiston, Androscoggin County (*in* Bent, 1942: 400).

Breeding.[1] This species nests in woodpecker holes, natural cavities, and bird houses, generally in open situations. Norton (1917: 258) stated that, on the coast where they are called "Martins," they are "the ready and almost exclusive tenants of the coast Martin-houses." He also reported them nesting in hollow stumps, hollow limbs and tree trunks, in "niches in buildings affording a dark retreat," in fallen hollow logs lying in the open, and recalled one instance of "an old wooden pump laid on the ground in a pasture, which was occupied as a breeding-place by a pair of these swallows for several years."

Grass or straw is placed in the cavity and then a lining of feathers. Five or six eggs usually make a clutch. Although birds often are seen nest-building by the end of the second week in May, and clutches probably are completed by May 25 on many occasions, the earliest records at hand are: four eggs found by E. Johnson (1900a: 10) on May 30, 1893, at Lisbon Center, Androscoggin County; and five fresh eggs found by Eckstorm on May 31, 1941, at Steuben, Washington County. Judging from other data at hand, the height of the laying season is the first ten days of June. "The male does his share of incubating and feeding the young and also often feeds the female while she is on the nest. Incubation requires about fourteen days and the young leave the nest in about sixteen days after they are hatched" (Knight, 1908b: 459). In Massachusetts, Austin and Low (1932) found that the interval between the laying of the last egg and hatching of the first varied from 13 to 16 days, and fledging required from 16 to 24. One brood is raised yearly.

Ecology. The number of breeding birds found at any locality, whether upland or lowland, is dependent on available nesting sites. Probably the species reached its greatest breeding population in Maine

[1] Robinson's (1927a, 1927b) important data were found too late to include here.

during a period after many inland bodies of water were dammed, when the resultant killing-off of many trees provided many natural cavities, as well as those made by woodpeckers in such areas. For example, Samuels (1867: 257–258) wrote: "When passing through the chain of the Umbagog lakes . . . I observed great numbers of these birds whose nests were built in holes in dead trees standing in the lake near the shores. These nests were so plenty, that, in the area of about ten rods square, I counted over fifty. Of course, the birds were in myriads." In 1903, Brewster (*in* Griscom, 1938: 554) noted that there were very few of these swallows at Umbagog as compared to earlier times, because most of the stubs had fallen down or been removed.

In early spring, during periods of low temperature, these swallows often are inactive for several hours after dawn. This is especially true at inland localities. Long after sunrise little groups may be seen huddling on the sunny sides of roofs, or on tree limbs or wires in sheltered places, in the period before their insect prey becomes active. Deane (1923) reported an incident at Grand Lake, Washington County, in late May, when Tree Swallows were found dead after a period of cold weather; others crowded together on a wire window screen where they were warmed by heat coming from inside a building.

This is our only common swallow that shows no gregariousness as a breeder. "Unlike their kin, they do not form colonies, being jealously watchful and pugnacious toward all birds of similar nesting habits, including their own kind" (Norton, 1917: 258). After the young are fledged, however, great numbers gather along waterways and at marshes, where they feed and roost prior to migrating. All our species of swallows are associates at these roosts as well as in migration.

The Starling seems to be an even more serious competitor for nesting sites than the English Sparrow, since the former is more generally distributed outside of urban areas in the state.

Remarks. After the cold weather in the south early in 1895, that killed so many birds of various species, this swallow was reduced noticeably in numbers in Maine. Spinney saw one at Seguin on April 11 of that year; Norton saw none in the Portland region until April 20, when two were seen, and he noted a marked scarcity of breeding birds that June in Knox County; McClain (*in* Knight, 1896d: 19) commented on the scarcity at New Vineyard, Franklin County. I am unable to state whether the Florida freeze in January, 1940, had any noticeable effect on the Maine breeding population.

Although it is difficult to determine population trends in such a widespread and adaptable species, it appears that the breeding population has been decreasing gradually for several decades.

Possibly the earliest reference to this species in Maine was Josselyn's (1674; 1865b: 79) mention of swallows "who will sit upon Trees."

Common Bank Swallow

Riparia riparia riparia (Linnaeus)

Summer resident, uncommon (colonial breeder) throughout, including a few marine islands; *transient,* fairly common in spring and fall.

Spring. Recent records indicate arrival during the first eight days of May, although in former years, when the species was much more numerous than at present, birds were noted earlier. (See Remarks.) Walch (1926: 64) stated that they arrived about May 1 at Brunswick, Cumberland County. A recent early date is May 4, 1940, when Weston saw this species at Brewer. Migration continues well into May.

Fall. The southward movement occurs from mid-July to about mid-August, with a few stragglers to the end of the month, and these later dates of occurrence: September 5 of unstated year at Pittsfield, Somerset County (*in* Bent, 1942: 424); September 5, 1895, in the Umbagog region (Brewster *in* Griscom, 1938: 554); and September 19, 1904, at Westbrook, Cumberland County (Norton *in* Brownson, 1906c: 64).

Breeding. Both sexes aid in digging a tunnel near the top of a bank of gravel, sand, clay, or even sawdust. (See Ecology.) Knight (1908b: 462) observed an instance where the period from beginning of digging to carrying of nesting material was about 15 days; he also stated that the tunnels go up at a slight angle then dip to the nest chamber. According to Gross (*in* Bent, 1942: 405), twenty tunnels in sand near Brunswick averaged 34 inches in depth, the longest being 48, and nine in clay averaged 19 inches, the shortest being 14 inches. A crude nest of grass, sticks, and straw, is placed in the chamber, and a lining of feathers is added during laying and incubation. In about 50 nests at Brunswick, Gross (ibid. 408) found clutches to consist of four and five eggs, and one set of six. Clutches generally are laid about the middle of June (Knight, 1908b: 462). Earliest dates are: three sets of four eggs each, at Westbrook, on June 6, 1888 (Norton); three fresh eggs (? incomplete set) on June 7, 1933, at Andover, Oxford County (R. F. Miller); and five eggs on June 10, 1932, at Topsham, Sagadahoc County (Gross *in* Bent, 1942: 408).

In New York, Stoner (1936: 195–196, 199–201) definitely established that both sexes incubate, the period being 14 to 16 days from the laying of the last egg to hatching of the first, that young fly when 18 to 22 days old, returning to tunnels to roost for some time afterwards or even making shallow tunnels of their own, and that two broods often are raised. Probably a second brood sometimes is raised in the same season in Maine.

Ecology. Perhaps the most important factor limiting the numbers and local distribution of this swallow is the small number of suitable steep banks in which to dig nest tunnels. This species twice has been reported nesting in shallow tunnels in thin turf overlying rock on marine islands, once by Judd (1889) and once by Kendall (1902a: 7). Nests in sawdust piles have been reported by D. Norton (1927), Brewster (*in* Griscom, 1938: 554), and Palmer and Taber (1946: 307). Merrill (1881a: 250) reported finding three tunnels, each containing two nests, at the Cranberry Islands, Hancock County. In 1934, in Oxford County, R. F. Miller noted that a colony was established in a roadside bank that was recently dug.

"Nest mortality in active gravel pits is very high, since spring road repairs coincide with nesting. In many large pits which may be frequented by many birds, very few succeed in producing young" (Mendall).

Of all our common swallows, the Bank Swallow is the most gregarious, showing a marked degree of coordinated activity among members of a flock during the breeding season. It also associates freely with other swallows.

Remarks. As already mentioned, earlier arrival dates for spring were noted in former years, these being: about the first of May in the Calais region (Boardman, 1862: 125); the last few days of April or first few in May in the Portland region (N. C. Brown, 1882f: 12); May 1, 1896, at Orono, Penobscot County (Knight *in* E. H. Norton, 1902); and April 19 to 25 in the Bangor region (Knight, 1908b: 461).

The breeding population has been declining for several decades, so that at present only a fraction of former numbers nest in the state. Numbers being so low, it would seem that any further change in the situation would have to be an upward one.

Besides a lack of suitable nesting sites, already discussed, these birds suffer from various predators. Chief predators, perhaps, are the many young boys who cannot resist an opportunity to dig out swallow nests.

Northern Rough-winged Swallow

Stelgidopteryx ruficollis serripennis (Audubon)

Summer resident at Ogunquit, York County, and one sight record for Lincoln County.

Breeding and summer. The following breeding data pertain to nesting in holes in a concrete retaining wall below the Sparhawk Hotel, which is near the mouth of an estuary at the southern end of Ogunquit Beach. "I first noted them on June 11, [1941] and found their nest of

twigs about 19 inches back in a four-inch-wide iron pipe on July 17, with some young still inside. There were three or four other birds in the vicinity which I took to be young of the first brood. On July 20 the three young of the second (?) brood were out of the nest, perched in a bush, where they were being fed by their parents. I have no records of them after that, so I cannot tell you the time of their departure" (Christopher Street, *in litt.*, June 28, 1948). The species was seen at Ogunquit in the summer of 1946 by H. M. Parker. "I have one poor sight record for Ogunquit in 1939; the species breeds there regularly now" (R. Smolker, *in litt.*, Feb. 4, 1948).

Outside the state, this species is reported as excavating a tunnel in a bank, adding some nesting material, laying four to eight (usually six or seven) eggs, with incubation variably reported as 12 to 16 days and fledging as 20 or 21 (*in* Bent, 1942: 426–429).

A single bird was seen on June 27, 1947, at Damariscotta, Lincoln County, by J. Cadbury.

Remarks. The Ogunquit birds were mentioned briefly in *Audubon Magazine* (1941, vol. 43, p. 460) and in *The Season* supplement to that issue (p. 466).

May (1930) gave a history of the northward spread of this species in New England, including a report of nesting in 1925 in the Township of Eaton, New Hampshire, a short distance from extreme southern Oxford County, Maine.

Barn Swallow

Hirundo rustica erythrogaster Boddaert

Summer resident, common to numerous in settled areas throughout, including islands; *transient,* numerous in spring and fall throughout.

Spring. The first few arrivals (males) generally are noted at points east to Bangor from April 25 to 28. Early dates are: April 12, 1871, at Scarborough (Smith); April 15 and 17, 1868, and April 17, 1879 (Smith), and April 18, 1890 (Norton), in the Portland region; and April 19, 1896, at Gardiner, Kennebec County (Lee *in* E. H. Norton, 1902). April 26 is Chamberlain's earliest date for Presque Isle, where the usual time of arrival is about May 6. In several different years, birds have been noted apparently migrating as late as May 22 in southwestern Maine. On May 30, 1941, Norton saw groups of about 12 to 20 birds, which he believed to be migrants, coming in from sea at Petit Manan Point, Washington County.

Fall. During the second week in July, scattered flocks are noted. Made up of that part of the population which does not raise a second brood, they may begin migration immediately or resort to suitable

feeding places until July 20 or later. Usually the last flocks are seen during the third week in August, with very small groups or single birds noted occasionally as late as September 20. Later dates are: September 21 of unstated year at Phillips, Franklin County (*in* Bent, 1942: 458); October 6, 1888, in either the Maine or New Hampshire part of the Umbagog region (Brewster *in* Griscom, 1938: 551); October 29, 1897, at Seguin (Spinney); October 31, 1907, at Portland (G. M. Allen, 1909: 172); and one seen on November 7, 1939, at Blue Hill, Hancock County (Martha Brewer).

Breeding.[1] Most nests are built on beams inside barns, but a few are built outside under eaves of buildings, and a few in fairly small sheds on islands. Quite often, old nests are repaired and used another year. Knight (1908b: 457) mentioned a nest attached to the side of a sea cliff at Seal Island in the Matinicus group. Norton (1917: 258) described this same nest as situated in a niche in the rock only a few feet above the surf; he saw four eggs in it in June, 1896. A nest was found on a sea cliff at Great Duck Island, off Mt. Desert Island, a few years ago (Bond, *in litt.*, 1948). Nests are semicircular when placed against a wall or beam, and circular when on a horizontal support only; they are made of pellets of mud, some straw, and hair, with linings of feathers (white ones preferred), dry grass, and straw. Norton (op. cit.) once found a nest lacking mud (being all lining) built inside an old lighthouse lantern. Nest-building probably is done by the female only.

Clutches usually consist of four or five eggs, although sets of six are not rare in the state. The two earliest egg records at hand are May 28, 1893, for five fresh eggs in Androscoggin County (E. Johnson, 1900a: 10), and May 29, 1931, for four fresh at Andover, Oxford County (Harris), but earlier clutches are indicated by H. Johnson's report (1921: 126) of hatching by June 9, 1920, at Pittsfield, Somerset County. Most clutches are completed by June 14. Outside the state the incubation period has been reported variably as 13 to 17 days. At Pittsfield, H. Johnson (ibid. 127) reported that incubation, by the female, required about 14 days. Probably the latter figure is fairly accurate. He also reported (ibid. 126) that during incubation, the male spends some time "on a roosting platform built of mud and near if not adjoining the nest." Outside the state, fledging has been reported as requiring 18 to 23 days (Bent, 1942: 448). The lower figure is near the average, and H. Johnson's report of about ten days at Pittsfield is far too short. The latter stated that care of the fledged brood falls upon the male while the female is laying and incubating the second clutch, and by the time the second brood is hatched, the first is fending for itself.

[1] Robinson's (1929) important data were found too late to include here.

There are a number of records of young of second broods still in the nest in late August, the latest date being September 4, 1915, when Norton observed a brood leaving a nest at Harpswell, Cumberland County. When only a single brood is raised, many of the fledged birds apparently are fed by adults until early August, and for a part of this period they may return to the nest to roost at night. When two broods are raised, however, fledged young of the first cannot use the nest as a roost for as long as they would otherwise, since generally the same nest is used for the second. P. L. Wright (1937a: 34) found that a pair built a new nest alongside the old one, for a second brood, on one of the Isles of Shoals.

Ecology. The Barn Swallow nests chiefly on horizontal supports in very sheltered places, showing a preference for more shelter than does the Cliff Swallow. Perhaps in precolonial times it nested farther inside caves and recesses in cliffs than the latter species, or else it has changed its habits. Except for the Tree Swallow, it feeds at a greater range of altitude from ground or water than do the other common swallows, and also perches more readily on flat surfaces (roofs, board walks, beaches, shores, rocks, and roads) than do the others. In the breeding season it is somewhat gregarious, neither shunning other members of the species to the degree characteristic of the Tree Swallow, nor exhibiting as great a colonial tendency as the other two common swallows and the Martin. Although generally found in rather small flocks, many Barn Swallows gather in late summer at favored spots to feed and roost. Bates (1895: 50) found this species to be the chief component, at one time, of a large swallow roost near Waterville, Kennebec County.

Remarks. Cold weather in early spring, as well as in summer, drives insects to cover and this occasionally results in death by starvation of many swallows. Norton (1925d: 472 and 1926c: 465) commented on the population increase after depletions from such causes.

Partial or complete albinos are reported occasionally. Boardman (1879) reported one that mated and nested with a normal-colored individual for two successive years at Topsfield, Washington County.

Norton's files contain a note on a hybrid between a Barn and Cliff Swallow, that was paired with a Barn Swallow in the summer of 1883 or 1884 at White Head Island, Knox County. They attempted nesting on a beam in a barn. The mud wall of the nest was built higher than usual with the Barn Swallow, but not roofed as with the Cliff. Nest-building was a prolonged operation, and the birds left the barn shortly after the nest was completed. The following spring it was occupied by a pair of Barn Swallows.

The old belief that swallows hibernate in mud once was prevalent

in Maine. Perhaps the last report of this belief was Grinnell's (1885) mention of a person, at Hunnewells Point [now Popham Beach, Sagadahoc County], who wagered that he could secure some hibernating birds the following winter for a thousand dollars, or forfeit a hundred.

A later occurrence than any in Maine is the one recorded by Pettingill (1939a: 354) for November 9, 1935, at Kent Island in the Grand Manan archipelago.

Eastern Cliff Swallow

Petrochelidon pyrrhonota pyrrhonota (Vieillot)

Summer resident, common to numerous in settled areas and probably absent elsewhere; *transient,* numerous in spring and fall.

Spring. Usually this species is seen in south-central Maine during the last few days of April, but often is not reported for Cumberland County until a few days or a week after it has been noted elsewhere. The average arrival date for five years at Pittsfield, Somerset County, was April 27 (*in* Oberholser, 1917: 321). There is a wide range in arrival dates for Portland, the average being about May 5. Early dates for various Maine localities are: April 11, 1896, at Orono, Penobscot County (Knight *in* E. H. Norton, 1902); April 21, 1899, at Pittsfield (*in* Oberholser, 1917: 321); one seen on April 25, 1942, at Brewer (Weston); and April 26, 1918, at Manchester, Kennebec County (E. C. Pope). Boardman (1862: 125) stated that this swallow arrived in the Calais region the first of May, and Chamberlain has noted it at Presque Isle as early as May 2. In at least some years, migration continues into the last week in May.

Fall. Whereas some birds begin flocking by the second week in July, those raising a second brood do not begin until August. Migration occurs in the latter half of July and the first 18 days of August, usually very few being seen later. Brewster (*in* Griscom, 1938: 549) saw several scores of these birds at Lake Umbagog on September 5, 1895. Later dates are: September 9, 1915, at Phillips, Franklin County (*in* Oberholser, 1917: 322); September 11, 1918, on Monhegan (Dewis, 1919: 40); September 13, 1943, at South Brooksville, Hancock County (K. Tousey); September 15, 1918, at Brunswick, Cumberland County (Walch, 1926: 63); September 19, 1904, at Westbrook, Cumberland County (Norton *in* Brownson, 1906c: 64); and September 20, 1884, at St. George, Knox County (Norton).

Breeding. This colonial nester builds under the eaves of barns, houses, sheds, and similar structures. Stanley (*in* Bowdish, 1909: 125)

reported 15 nests under the lantern deck of the lighthouse on Great Duck Island, Hancock County, in 1907; Norton saw about 50 nests there on June 30, 1931. E. Johnson (1900a: 9) reported 12 nests built against beams inside a barn in Androscoggin County, and R. F. Miller wrote me that he found these birds nesting "exactly like Barn Swallows" on beams inside a barn at Rumford, Oxford County, in 1933. Norton (1917: 258) stated that he knew of several instances of nests inside buildings, but that these were covered like outside ones. The nest tends to be spherical, except flattened on the side or sides of attachment, and is built close to an overhanging protective she ter. The openings now are built with less of a constricted and projec ting neck, that is lateral or slightly ventral, than formerly was the case (see Remarks). The structure is made almost entirely of mud pellets and lined with straw, hair, and feathers. Brewster (*in* Griscom, 1938: 551) noted that several were completed, at least externally, in five days.

Knight (1908b: 454) stated that three to six (usually four) eggs make a clutch. Whereas nest building has been observed frequently by May 20, and there are data for incomplete clutches by June 4, the earliest records for completed clutches are four fresh and four slightly incubated eggs found by Harris on June 8, 1940, at Holden, Penobscot County. Other data show that clutches are completed at least to June 27. According to Knight (ibid.), incubation requires about 14 days, fledging 16 or 17, and both sexes incubate and care for the young. Outside the state, the incubation period has been reported as two days less than Knight's figure. Fledged young have been seen in the state as early as July 2, which might indicate slightly earlier dates for completed clutches than given above. Young remained in three nests until August 21, 1942, at Berwick, York County (Dr. Anne Perkins). Perhaps a second brood is raised occasionally. The same nest may be used for the second brood and also is occupied the following year.

Ecology. The Cliff Swallow is more partial to the vicinity of water than is the Barn Swallow, and is more at home on our coastal and offshore islands than any other swallow. A surface with an overhanging shelter is the prime requirement for nesting, and a limiting factor in local distribution. This swallow perches in about the same range of places as the Barn Swallow, but alights less often on flat surfaces. It is highly gregarious during the nesting season and migrations, and social toward other swallows. The English Sparrow is parasitic on this species, occupying nests in spring before the owners arrive.

Remarks. Forbush (1929: 144–145) undoubtedly was correct in stating that this species was not a newcomer in the northeast as some persons have believed. Baird, Brewer, and Ridgway (1874, 1: 336)

stated that Verrill, having found these birds nesting on limestone cliffs at Anticosti Island in 1861, made inquiries as to how long they had bred in the northeast and came to the conclusion that they were known in parts of Maine earlier than their discovery in the west. Audubon (1834: 249) stated that Theodore Lincoln, a resident of Dennysville, Washington County, had found this swallow abundant on his arrival, nearly 40 years before, in the then unsettled country. In 1800, swallows nested the length of the eaves of a barn at Union, Knox County (Steel, 1831: 356); undoubtedly these were Cliff Swallows. They were abundant in Calais in 1828 (Boardman, 1903: 195).

Numerous local changes in the population of this species are known. For example, Brewster (*in* Griscom, 1938: 549–551) noted an increase during his visits to the Umbagog region from 1871 to 1909. Knight (1908b: 455) stated that the species was rare about Bangor in his boyhood days, but common or abundant at the time he wrote. Although some nesting sites have been occupied for nearly 40 years, at other localities the birds shift about, using a site only a few seasons, then abandoning it. This gives the appearance locally of greater fluctuations than actually is the case for the state as a whole, although generally the population may have decreased slightly during recent decades.

Cold and damp summers result in a scarcity of flying insects, thus causing starvation of many swallows, as in 1922, and during prolonged rains nests may come unfastened and fall.

On July 21, 1880, a "perfect albino with pinkish eyes" was found beneath a nest from which it had fallen, at Brewer (Hardy).

Formerly, the nest of this species was gourd-shaped and had a neck several inches in length. It was well illustrated by the plate drawn by Audubon, in 1829, for his *Birds of America*. Hardy (1896b: 115–116) pointed out that, with a shift from exposed cliffs to under protective eaves, such necks or collars were unnecessary and often not added. Brewster (*in* Griscom, 1938: 550), in describing nests observed at Errol Dam, in the New Hampshire part of the Umbagog region, wrote that nearly all that were finished on June 15, 1903, were of the "old-fashioned type, i.e. with well-marked bottle necks." Knight (1908b: 454) stated that some of the nests he had seen had necks.

According to Forbush (1929: 147), Mr. E. O. Grant observed three birds, believed to have been two males and a female, help build the same nest and later share in incubation; this was in Aroostook County.

I have previously mentioned (p. 161) Audubon's report of the Sparrow Hawk tearing open nests of this species in Maine.

Northern Purple Martin

Progne subis subis (Linnaeus)

Summer resident, common at scattered localities (colonial breeder) in settled areas, and absent from large areas of the mainland and apparently all islands except perhaps as a rare visitant; *transient,* regularly uncommon in settled areas including islands.

Spring. This species generally arrives about April 21 to 24 (rarely not until May) at points east to the Penobscot River, and at Presque Isle about May 4. The species often is seen in the west-central section earlier than in the southwestern part of the state. Early dates are: April 12 of unstated year at Lewiston, Androscoggin County (*in* Bent, 1942: 507); April 16, 1914, at Norway, Oxford County (*in* Oberholser, 1918b: 148); and April 18, 1946, in Androscoggin County (W. H. Waterman). Chamberlain's earliest date for Presque Isle is April 26. Males arrive first, and flocks containing both sexes are noted until May 14 or later.

Fall. Some flocks depart very early in August and the species seldom is seen after the 20th. It appears that, after leaving nesting sites, the early migrants spend little or no time at roosts before departing. This species was the only remaining one in a swallow roost near Waterville, Kennebec County, on September 9, 1894 (Bates, 1895: 51). Later dates of occurrence are September 12 of unstated year at Pittsfield, Somerset County (*in* Bent, 1942: 508), and September 30, 1904, at Avon, Franklin County (Sweet *in* Brownson, 1906c: 64).

Breeding. These colonial birds nest in houses or boxes provided for them. The nest is reported to consist of grass, leaves, feathers, and often a little mud. "Nest building may take from five days to three weeks, or at least it is that length of time after they first begin to carry material before eggs are laid" (Knight, 1908b: 451–452). There are no data on clutch size (probably four or five eggs), the only reference to egg dates being Knight's (ibid. 451) statement that "the time when fresh eggs may be observed varies from June fifteenth until July fourth." He also stated (ibid. 452) that incubation, by both sexes, "seems to require sixteen days," plus or minus one day, and that the young are fledged in 16 to 18 days. Outside the state, others have reported the incubation period variably from 12 to 20 days, and chiefly by the female; Forbush (1929: 141) gave 24 to 28 days as the fledging period, and stated that the young sometimes remain in the nest for six weeks. At Berwick, York County, Dr. Anne Perkins (1947: 49) observed that the young roost in the nest for several nights after being fledged. Knight (1908b: 451) believed that only one brood

is raised yearly. Fledged young have been seen at various places on dates from July 13 on.

Ecology. This is a bird of agricultural and suburban lands. Martin houses should be placed in the open, away from trees, on tall poles, and be so constructed as to allow some ventilation. The birds will occupy a house beside a busy street. On arrival in spring they clean out the debris, even the eggs and young, of English Sparrows and Starlings. A few reports at hand indicate that, although it took from one to several days to accomplish, Martins gained control of houses from these two competitors, but there are other reports which suggest that the competition is very serious. One sometimes sees a house shared by Martins and Sparrows.

After the breeding season, some of the Martins gather at swallow roosts, or roost by themselves for a period before migrating. Gregarious but not social, Martins in flocks do not mingle freely with other swallows in communal roosts.

Remarks. In the notebook of Manasseh Cutler (1897: 125–126), it is recorded that the spread of this species northeastward had been gradual and "easily marked." Their presence was noted in Connecticut in 1765, and, under date of May 14, 1787, at "Portland, Casco Bay."

There is considerable evidence that at one time Martins were very common in the state. H. Herrick (1873: 31) stated that they were very common on the coast (apparently meaning Washington County). They were breeding in "great abundance" in Washington County in June, 1877 (Smith). Batchelder (1882: 110) stated that in 1879 the species seemed to be generally distributed in eastern Maine, including parts of Aroostook County. For the Portland region, N. C. Brown (1882f: 11) reported them as common in some localities and almost unknown in others. Various contributors to the *Maine Sportsman* in 1897 stated that the birds were maintaining their numbers in some localities in the state, but noticeably decreasing in others, even including places then uninhabited by English Sparrows. In the summer of 1903, severe weather caused the deaths of young and many adults in much of New England, but, according to Forbush (1905: 26), in Maine, "they suffered little except in the southwestern portion . . . and appear to be increasing in numbers rather than diminishing." Actually, the decline had already begun. By the 1930's, the species was absent from large areas in eastern Maine, and from smaller ones in the western part of the state, where it had occurred formerly.

At the present time colonies are small and widely scattered. It is difficult to determine whether there has been a slight increase during the past few years, or whether there has been more thorough reporting of the remaining colonies. In any event, the erection of more houses probably would result in a larger population.

Forbush (1929: 141) stated that Martins collect green leaves to place in the nest, and that occasionally large colonies cause injury to pear trees by stripping limbs of leaves for this purpose. Dr. Anne Perkins (1947: 49) has noted the same habit of using pear leaves at Berwick, York County. According to a note at hand, a late instance when she observed this was July 1, 1942.

Flying at night in June and August was mentioned by Bates (1901: 400). This species was heard in flight after dark on July 8, 1940, at Westbrook, Cumberland County (Norton).

Mention of Martins dying of cold on May 23, 1832, in Knox County (C. Eaton, 1851: 339) may refer to Tree Swallows.

An early extralimital record is for a specimen, recorded by Pettingill (1939a: 355), taken on April 10, 1909, on Grand Manan.

Family CORVIDAE

Canada Gray Jay

Perisoreus canadensis canadensis (Linnaeus)

Resident, locally migratory or wandering, uncommon but regular in coniferous forests of Oxford, Franklin, Somerset, Piscataquis, Aroostook, Penobscot, Washington, and probably northern Hancock County, with limits of breeding range unknown, and occasionally wandering to other parts of the state in winter.

Breeding. Writing of this species in Maine, Audubon (1834: 54) stated: "It begins as early as February or March to form its nest, which is placed in the thickest part of a fir-tree, and at a height of from five to ten feet." In the western part of the state, nests are placed about 15 to 20 feet up in evergreen trees in swamps, and four to six eggs are laid in late March or early April (J. G. Rich, 1893a). Knight (1908b: 330) wrote: "Lumbermen have repeatedly told me of finding the nests in March, usually noting a number of twigs on the surface of the snow and on looking up to see where they had fallen from would discover the nest in a fir or spruce tree at no great height. The bird was usually on the nest and was reported to me as sitting very closely so that it had to be removed by hand."

According to Knight (ibid.), three to five (usually four) eggs make a clutch. Carpenter (1886b: 161–162) reported two sets from the vicinity of Parmachenee Lake in northern Oxford County, one of three eggs being taken on March 28, 1881, and the other of four taken three days later. He wrote that the nest from which the latter set was taken, was "bulky, and nearly every obtainable variety of moss, lichens, hair

and feathers entered into its make up; these were placed on a foundation of rather coarse twigs." G. M. Allen (1909: 134) gave egg dates for Maine as March 16 to 28.

In Minnesota, O. B. Warren (1899) found incubation, performed by the female only, to require from 16 to 18 days, and both parents to care for the young, fledging requiring about 15 days. Hardy (*in* Bendire, 1895: 387) stated that a guide informed him of seeing flying young in northern Maine about as early as April 10. Norton saw an unattended juvenal bird on May 24, 1932, at Northeast Carry, Piscataquis County. On June 18, 1945, I saw a bird in juvenal plumage being fed by its parents, in Township 5, Range 4, Oxford County. One brood is raised yearly.

Ecology. In summer pairs or family groups usually are found in coniferous forests, where they apparently feed on a wide variety of berries, other vegetable matter, and such animal matter as they can obtain. In winter they gather in flocks of three or four to more than two dozen, and then their scavenging habits are more pronounced. The winter flocks roam about, finding food wherever it is available, but occurring most often about deer yards and lumber camps. In mountainous areas of the state, the birds generally frequent lower altitudes at this season.

Hardy (ibid. 386) noted the following habits, some in summer and others in winter: eating left-overs of all types of food eaten by humans; making off with a supply of candles; pecking a hole in a cake of soap; eating the breast meat from a picked duck; alighting in a canoe and pecking at a skinned beaver carcass; eating deer meat; removing bait from traps; eating trapped animals; and eating insects, mushrooms or fungi, and mountain ash berries. Because of their habit of eating animal droppings, they were given a name by the Penobscot Indians, which, translated by Speck (1921: 365), means a bird that eats offal.

Remarks. Among the more noteworthy records of occurrence south of the breeding range are: one shot on October 15, 1880, at Scarborough (N. C. Brown, 1882c); one shot on October 30, 1880, at Freeport, Cumberland County (W. C. Kendall); one shot about November 4, 1904, at Falmouth, Cumberland County (Rich); seen on November 27, 1936, on Mt. Desert Island (T. Eliot); one seen on January 14, 1919, in the residential section of Lewiston, Androscoggin County (C. E. Miller); one seen on January 16, 1946, at a feeding station in Bangor (Mrs. H. E. Farnham); and two seen on March 21, 1938, near Auburn, Androscoggin County (D. Norton).

For a very interesting account of food storing and other habits of this bird, the reader is referred to Brewster (1937: 503–508).

To Knight's list (1908b: 328) of local names for this bird, should

be added "Gorbie," a New Brunswick name which also is used in a few Maine localities, and "Cedar Jay," which Norton found in use at some unstated Maine locality.

This species has been decreasing in the state for many years. It often is shot merely because it is a living target. Although there is some little justification for shooting by trappers, for the birds eat trap bait, peck holes in the carcasses of trapped animals, and eat meat hung up for camp use, we are inclined to agree with Carpenter (1886b: 162), who wrote: "He may be a thief, but his jovial companionship is beyond the price of his board bill, in the dark still forests he claims as his home."

The report of occurrence in June, 1939, on Mt. Desert Island (*in* Tyson and Bond, 1941: 65) is of questionable accuracy (Bond).

Northern Blue Jay

Cyanocitta cristata bromia Oberholser

Resident, common breeder on the mainland in southern Maine, diminishing to uncommon in eastern and northern sections, and rare on some larger marine islands, and partially *migratory* in spring and fall, the extent of migration and number of birds involved varying markedly from year to year; *transient* in unknown numbers.

Migrations. A return movement to the breeding places begins in April, reaches its peak the second and third weeks of May, and ends in early June. Brewster (1937: 500) stated that migration "does not wholly cease" before June 10 in the Umbagog region. That some birds are transient was revealed by Tyler's statement (*in* Bent, 1946: 52) that one banded bird flew from New York to New Brunswick, and another from Massachusetts to Prince Edward Island; both records are for spring. A southward movement begins early in September, usually is most in evidence the second and third weeks of the month, and does not end until late October.

Breeding. The nest usually is placed on a branch or near the trunk of a young conifer, but also occasionally in a deciduous tree, and usually from six to 15 feet from the ground. Knight (1908b: 327) described a nest as "composed outwardly of twigs and rootlets lined with fine black rootlets and some feathers." He also stated (ibid.) that three to six, generally four, eggs make a clutch. The earliest date at hand is for a set of five fresh eggs taken on May 17, 1939, at Dedham, Hancock County, by Eckstorm, but most sets are completed later in the month. A new nest without eggs was found on June 14, 1934, at Andover, Oxford County (R. F. Miller). There are a number of

indefinite reports of eggs in late June, and A. R. Phillips' notes contain mention of a nest in which the eggs hatched about July 4, 1937, at Jackman, Somerset County. Knight (1908b: 327–328) stated that both sexes aid in nest building and incubation, the latter requiring 16 days, and that fledging requires 21 days or a little longer. At Ithaca, New York, Arnold (*in* Bent, 1946: 38) found incubation to be slightly longer, 17 or 18 days, and fledging to require 17 to 21 days. Both sexes care for the young. One brood is raised yearly.

Winter. Although the jay population is at its lowest in winter, the species is found all the way from the coast and islands to northern Aroostook County. Yet in some winters (as in 1937–38), there are a great many in southern Maine, and in others (as in 1946–47) there are comparatively few. Apparently migration depends not only on the age of the birds, adults being less migratory than birds of the year, but also on the mast crop, the bulk of the birds moving out of the state at the time of the fall migration if mast is scarce.

Ecology. The Blue Jay is a bird of mixed woodlands, especially those containing oaks, beeches, and hemlocks. In former times this bird was shy and avoided the vicinity of houses, but in the last 50 years it has changed its habits, being seen often in cities and nesting in trees on lawns at present. Outside the nesting season, the birds usually travel in small flocks.

Remarks. Not only are there marked differences in the winter and migrating populations from season to season, but also noticeable longer trends in population changes. Williamson (1832: 103) reported that, in September, 1738, jays were more abundant than ever before known.

Blue Jays occasionally are seen, especially in early autumn, on small islands where there are comparatively few trees. They are fairly common on Monhegan some winters.

Knight (1908b: 328) gave a long list of foods eaten by this bird. Several times Norton noted this jay eating tent caterpillars in apple trees in the Portland region. In September, 1936, he was informed that flocks of Blue Jays ate much corn at Naples, Cumberland County, and that it was the first time this had occurred there. Berry and mast crops were failures that season, so these birds were forced to find other good. By eating corn in gardens, they were reverting to a habit which had been prevalent at the time the state was being settled and the land first planted to corn.

In 1806 a motion was carried in town meeting at Vinalhaven, Knox County, to pay a bounty of ten cents on Blue Jays (Lyons and others, 1889: 17).

Northern Raven

Corvus corax principalis Ridgway

Resident, fairly common (although rather local) on the coast and islands from eastern Casco Bay eastward, and in lesser numbers at inland localities in Aroostook, Piscataquis, Penobscot, Hancock, and Washington Counties, and probably a few other places. Occasionally, individuals wander considerable distances from breeding areas, mainly in fall and winter, and may be found almost anywhere in the state.

Breeding. On the coast and inland, both cliff and tree nests are built. These are repaired and used again on successive years. In one instance, Norton was told, a nest at a cliff site had been occupied for 27 years. If a nest is destroyed, the pair usually will build again in the vicinity. Tree nests generally are 15 to 35 feet above ground, and cliff nests may be only a dozen feet above water on a seaward-facing cliff, or high up, and may or may not have an overhanging shelter. On March 1, 1940, a pair was seen, one of the birds performing an aerial courtship flight, at Clifton, Penobscot County (Eckstorm). A pair was seen carrying nesting material on March 8, 1946, at Wood Island, off Popham Beach, Sagadahoc County (W. Taber). On March 26, 1938, Norton saw a Raven at an old nest, newly lined, on Great Spoon Island, east of Isle au Haut.

Of records for completed clutches, four are for four eggs, three are for five, and one for six. The earliest date is for a set of five, slightly incubated, found on March 28, 1940, in Hancock County (Eckstorm), and the next is for four, slightly incubated, on March 29, 1941, in Lincoln County (Harris). As early as April 19, 1885, four [partly feathered] nestlings were found, in Knox County (Norton, 1895: 361), and a brood in natal down was noted on April 19, 1923, at Cross Island, Jonesport, Washington County (Norton). On the other hand, four eggs, only slightly incubated, were found as late as May 8, 1896, at Seguin (Spinney). Laying at far inland localities may occur slightly later than on the coast, but data are not sufficient to determine this positively. Harlow (1922: 409) reported that, in Pennsylvania, incubation, requiring 20 days, was performed mostly by the female, the mate taking over when she left the nest in cold weather only, and that young, fed by both parents, were fledged in about four weeks and remained in the vicinity of the nest for about a week longer. Four weeks for fledging seems too short in comparison with the 42 to 45 days given by Ryves (*in* Witherby, 1941: 256) for the race occurring in Britain. One brood is raised yearly.

Ecology. The Raven is chiefly an inhabitant of wild lands at all altitudes, from low marine islands to inland mountains. The species

is somewhat gregarious after the breeding season, flocks gathering to feed or roost at secluded places; this is especially noticeable in the population on the coast and islands. The Raven is not social toward the Crow and often is 'mobbed' by its smaller relative.

History. Some authors have considered the Raven a scarce bird in Maine. Within historic times, however, the bird has been neither scarce nor uncommon on the eastern coast, even during the period of persecution.

The Raven appears to have been mentioned by all the early explorers of our coast who included natural history in their narratives. Probably the earliest was mention by Rosier (1605) of occurrence in the vicinity of what is now St. George, Knox County. Josselyn (1674; 1865b: 78) reported the species as numerous, undoubtedly referring to Scarborough where he lived for a number of years. As the coast was settled and islands to the eastward used for sheep grazing, Ravens were killed and their nests destroyed at every opportunity because of alleged damage to young lambs. Merrill (1881a: 249) stated that inhabitants of Isle au Haut told him Ravens killed lambs "by alighting on them and picking out their eyes"; he also reported several of these birds killed there in the winter of 1879–80 from eating poisoned meat put out to kill foxes.

Although the birds along the southwestern coast were practically exterminated, many continued to breed from Seguin eastward. Westward on the coast, and inland as far as the York County boundary, occasional stragglers were seen or shot in fall and winter, with one summer occurrence (bird seen) on May 29, 1869, at Scarborough (Smith). After having increased in southern Sagadahoc County over a period of years, the species reoccupied breeding sites in eastern Casco Bay about 1925. It is unlikely that the bird will ever be more than a straggler in coastal York County because of the lack of secluded sites there.

At the present time, six or seven Ravens may be seen together in summer at favored feeding places, especially on islands. Cruickshank (1938: 551) reported the species as "surprisingly common" on some of the outlying rocks and islands in Muscongus Bay. The greatest (and very exceptional) number seen by him at any one place, was 32 birds on June 10, 1941, at Little Green Island, off western Penobscot Bay. One day in July, 1946, he saw 14 together in Muscongus Bay.

As for the inland population, Holmes (1861b: 336) reported that the Raven and other "rather rare" birds were procured, August 23, 1861, in Township 5, Range 8, Penobscot County, by the state scientific survey party. Hardy, who was a member of this party, noted in his journal that a Raven was captured alive that month, but

later it escaped. The locality was within 25 airline miles of the summit of Mt. Katahdin.

Verrill (1862a: 151) considered the species as very rare at Norway, Oxford County. J. G. Rich shot a Raven at one of the Richardson Lakes, Franklin County, on unstated date (Maynard and Brewster, 1871: 375). In Aroostook County in 1879, Batchelder (1882: 149) did not find any at Fort Fairfield, and reported them as very rare at Houlton. Brewster (1937: 508–509) recorded only two birds seen, October 23, 1883 and October 7, 1888, in the Umbagog region. There is a mounted specimen, obtained by him, from Upton, Oxford County, in the collection of the Boston Society of Natural History; it is not clear whether Brewster collected the specimen himself or purchased it. In August, 1891, Hardy noted in his journal that Ravens were not "as numerous" as in former years at Passadumkeag, about 30 miles north of Bangor. A Raven was shot at Pittsfield, Somerset County, in November, 1897 (Morrell, 1898a: 20).

In July, 1921, W. Fanning (1921: 77) saw this species twice at Mt. Katahdin. Naturalists visited the mountain quite regularly thereafter, but there are no records of the bird's occurrence until after 1940, after which they have increased markedly. Six were seen on the mountain, near Hamlin Peak, on September 8, 1947 (W. Drury).

Since 1935, Mendall has noted a steady increase in the number of these birds in the interior of Washington and in Aroostook and northern Penobscot Counties. On April 11, 1936, Harris found a tree nest with five eggs at Weston, Aroostook County. In 1940, Eckstorm reported the species increasing in forested areas inland. That year he found them nesting at Clifton, 18 miles from Bangor, where he had not seen the species "till recent years." The species was noted in 1946 at Monson, Piscataquis County. Increase in numbers and extension of the breeding range have continued to the present (1948).

Remarks. Little has been reported about the food of this bird. The stomach of a female, shot on February 7, 1894, in Knox County, contained barnacles, part of a Hymenopterous insect, "a few mussels of *Modiola modiolus*, carefully shelled, and a few fish bones, with some vegetable matter" (Norton, 1895: 363). A pair was observed chasing a Purple Sandpiper, but the latter escaped (ibid.). Knight (1908b: 331) stated that all kinds of carrion are eaten readily. In February, 1894, Norton (1923a: 21) observed that a pair of Ravens made daily flights for food, going from island to island off western Penobscot Bay, the daily circuit believed to have been about 17 miles.

The nest mentioned by Clark (*in* Knight, 1908b: 330) as "near Lubec," was on Campobello Island, New Brunswick.

Eastern Crow

Corvus brachyrhynchos brachyrhynchos Brehm

Summer resident, common throughout, including islands, except in areas of extensive forests where rare; *transient,* numerous in spring and abundant in fall, occurring in greater numbers in coastal counties than in the interior; *winter resident,* usually fairly common on and near the coast, but uncommon more than 50 miles inland. Undoubtedly a few are resident, performing short migrations within the state.

Spring. Migration occurs from about March 1 to early May. Small numbers of migrants often are noted in southwestern Maine between March 1 and 4, in southern Penobscot County from March 4, and at Presque Isle from about March 10. If the weather is mild in late February, there is some movement of birds that have wintered on the coast.

Fall. In some years, sizeable flocks (over a hundred birds) have been noted by the second week in August, usually in the interior of the state. These scatter to feed during the day, and gather to roost at night. Usually by September 1, the number of birds inland has decreased noticeably. By about October 6, migration usually has ended in northern counties, but near the coast, at least in some years, a few birds continue migrating until about the end of the month. Some roosts are occupied until near the end of the migration period.

Breeding. Gross (*in* Bent, 1946: 229) stated that of 22 nests observed in Maine, 12 were in pines, six in spruces, three in firs, and one in an oak. Knight (1908b: 335) wrote: "The nest usually is built on a firm foundation of sticks and branches of various convenient kinds, then more or less cedar and hemlock bark is used; some nests have considerable mud cemented into the foundation, others are without it. They are lined with more or less fine cedar and other bark, and often horse or cow hair and wool. . . I have found full sets of eggs at various dates from April 21 to June 15, but the last week in April and the first week in May are the usual times to find eggs." Nest building has been observed as early as April 6, 1889, at Westbrook, Cumberland County, by Norton.

Knight (ibid.) reported four to seven eggs per clutch. Records at hand are for eight sets of four eggs, 17 of five, and four of six; the eggs were fresh or nearly so, and most were taken from April 27 to May 9. Earliest egg date is for a set of five fresh on April 16, 1910, by Eckstorm at Brewer, and the latest, given in Bent (1946: 258), is May 27. Young have been found in nests as early as May 8. Verrill (1862a: 151) stated that on May 25 he had found young nearly ready to leave the nest, and unhatched eggs on the same day, at Norway, Oxford

County. According to Knight (1908b: 335), both sexes build the nest and incubate the eggs, incubation requiring 17 to 20 days, and the young are fledged in about 28 days. Gross (*in* Bent, 1946: 233, 234) gave 18 days for the incubation period and about five weeks for the fledging. During nest life and for a considerable time thereafter, the young are fed by both parents. One brood is raised yearly.

Winter. Brewster (1937: 509) stated that the Crow was not known to spend the winter in the Umbagog region. J. G. Rich (1884) wrote that the species was present at Bethel, Oxford County, in early January, 1884, and that this was an uncommon event. Although occasional individuals or small flocks sometimes remain in the interior during mild winters, most birds are seen on or near the coast. Four to six, rarely as many as 30, birds may be seen at points on the coastal mainland and adjacent islands. Farther seaward, especially in the Matinicus Islands, Crows have been rather numerous some winters and scarce in others.

Ecology. The Crow is an inhabitant of cultivated and uncultivated areas, including open and partly wooded country. Carpenter (1886a: 25) was the first of several persons to note that the species is scarce in summer in heavily forested areas. This species seems to be following the Blue Jay pattern in that a few now are suburban dwellers. The coastal region is a favored habitat at all seasons, with food obtained in fields, but more often from the rocks and flats exposed by the ebbing tide. The species is gregarious in migration and winter.

Remarks. Among interesting food habits of the Crow, as noted in Maine, are the following: feeding on Harbor Seal carcasses (Gross *in* Bent, 1946: 240; and others); eating a dead House Cat in winter (Norton); hunting Meadow Mice in fields, especially in early spring and again after mowing (Norton; Palmer; and others); chasing and catching a sandpiper in December (Clark, 1914: 249); catching a Red-breasted Nuthatch while that bird was excavating a nest cavity (Fernald, 1890: 40); robbing nests of young Robins (Hardy *in* Bendire, 1895: 408; Kendall, 1902b: 29); removing a Song Sparrow from a mousetrap and flying off with the bird (Norton); eating eggs of terns and gulls (several observers), of Guillemots (Knight, 1908b: 333), of ducks, especially on outer islands (several observers), of Black-crowned Night Herons (Gross *in* Bent, 1946: 239; and others), of a Raven (Spinney, 1896); catching fish (Hardy *in* Brewster, 1883a; J. P. W., 1886); eating dead fish (Gross *in* Bent, 1946: 240); eating grasshoppers (Ford, 1893); eating various marine invertebrates, including snails, whelks, and sea urchins (Hardy *in* Bendire, 1895: 408; Gross *in* Bent, 1946: 240), some, having hard shells, being carried into the air and dropped on rocks or the ground; feeding in early spring

on frozen apples that have remained on trees through the winter (Brewster, 1937: 509); and eating a variety of other animal and vegetable matter (*see* Knight, 1908: 333).

To increase ammunition sales, in the summer of 1924 the DuPont Powder Company sponsored a nationwide campaign to get people to shoot Crows. The figures, as given out later, showed only 12 birds killed in Maine. Former Governor Baxter, in a public statement, pointed out that people in the state apparently had not been misled into killing many of these birds, and that they realised that the beneficial habits of the Crow more than offset depredations in cornfields and elsewhere.

Yet the food habits of this bird are such that it is a serious pest in places, especially when it eats eggs and young of various birds, digs up potatoes, and pulls up corn, beans, and peas. The habit of eating carcasses of mammals is confined mainly to the winter months when many of the usual food items are scarce.

Following is a partial summary of Crow bounty legislation in Maine. On May 7, 1798, the town of Winthrop, Kennebec County, voted a bounty of 25 cents per Crow. In 1801, Vinalhaven, Knox County, voted a bounty of three cents. In 1802, Minot, Androscoggin County, voted "12 cents and 5 mills on the head," which was increased to 20 cents on December 12, 1803, but the vote afterwards was rescinded. At a shilling a head, Warren, Knox County, paid out the equivalent of $24.67 in bounties in 1803 and 1804. In 1806 in Vinalhaven, a motion was carried to pay a ten-cent bounty. In 1830, the state passed an Act to encourage the destruction of Crows, paying a bounty of eight cents each "dead or alive," and the bounty to be paid through the towns. Under this Act, the town of Warren received: $33.68 in 1831 (421 Crows); $11.68 in 1832 (146); $6.64 in 1833 (83); and $6.56 in 1834 (82). The Act was repealed in 1834 after the state had paid out to various towns about $3,400 in four years. Then the matter of bounties seems to have subsided somewhat. There was another state bounty in 1889–90, the repeal of which was approved on March 11, 1891. The appropriation of bounty money for 1889–90 had been exhausted quickly. Of 241 towns making returns, some of the leading ones were Harpswell (434 Crows), Union (430), Waldoboro (367), and Newport (329). The state treasurer's report for 1891 listed $2,664.30 paid for Crows. In 1917, two bounty bills failed to pass in the state legislature, and in 1926–27, another failed to pass.

One of the largest flocks of Crows reported in Maine was noted on October 19, 1900, near Portland. According to the local press, the flock was about ten rods wide and took a quarter hour to pass over a given point.

One spring, about 1900, a nest was found at Yarmouth, Cumberland County, that contained three young, two of which were pink-eyed albinos. The latter were mounted by John A. Lord and, according to Rich, were sold to the collector, John Lewis Childs.

Since the Crow first was recorded as occurring in the state, by Josselyn (1674: 1865b: 78), this bird undoubtedly has spread and increased with the clearing of the land. There are no data on population changes (if any) in recent decades.

Family PARIDAE

Black-capped Chickadee

Parus atricapillus atricapillus Linnaeus

Resident, common throughout, except rather scarce in summer in coniferous forested areas, and wandering from late summer to early spring; in some seasons a fairly well defined *migratory movement* takes place, when birds from elsewhere are *winter visitants,* and part (sometimes most) of the breeding population leaves the state.

Migrations. When such movements occur, the fall flight may last from October into January, with the return movement extending from some time in March until at least late April, if not later.

Breeding. These birds nest near the edges of woodlots and clearings, in brush-grown pastures, and sometimes in deep woods. Usually the nest is located from three to six feet above ground in an old stub, the most common being white birch, the wood of which is rotten but the bark still intact. Occasionally used are natural cavities in trees, fences, and even in buildings. Both birds work for a week to ten days excavating, then spend three or four more days in gathering feathers, fur, moss, and cocoons which make a felt-like lining in the bottom of the cavity. An egg per day is laid until the clutch of five to ten (usually six or seven) eggs is completed. Clutches of fresh eggs may be found from about May 10 to the end of the month. (Summarized from Knight, 1908b: 606–607, with additions.) Morrell (1899e: 120), describing a nest in a small natural cavity which the birds could not enlarge, stated that the eggs were in two layers, three on top being incubated and four on the bottom being addled. Incubation, by both birds, begins after the clutch is completed and requires 11 days (occasionally 12 or 13), and young, fed by both parents, leave the nest in 13 or 14 days (Knight, 1908b: 607). A fledging period of 14 days has been reported by Miss Stanwood (1909: 109). One brood is raised yearly.

Ecology. This chickadee usually is found in mixed or deciduous woodlands, especially about clearings, and in brushy situations. It occurs in both moist and dry situations, showing no marked preference in this respect, but it appears to prefer more sunlight than does the Acadian Chickadee. In fall and winter, these chickadees appear to be less restricted in habitat, flocks occurring wherever there are trees or bushes of any kind. Outside the breeding season, the species is gregarious and social, numbers occurring, in roving groups, with Downy Woodpeckers, nuthatches, Acadian Chickadees, Brown Creepers, and kinglets.

Remarks. There are several reports at hand of these birds excavating cavities in late winter. Apparently these were used for perching and roosting only, since in two instances there is definite information that the cavities were not used later for nesting.

In writing of these birds at Pittsfield, Somerset County, Morrell (1899e) stated that he had seen them pick up crumbs in their claws and carry them to limbs before pecking the food into smaller pieces. He also gave a detailed description of how they tapped maple trees in spring by striking "two or three strong, slanting blows in woodpecker fashion."

This chickadee is the state bird by an Act of legislature of 1927. The measure passed both houses and was signed by former Governor Ralph O. Brewster on April 8.

Acadian Boreal Chickadee

Parus hudsonicus littoralis Bryant

Resident, uncommon, with southern limit of summer occurrence (and probably of breeding) at approximately central Oxford, the southern parts of Franklin, Somerset, and Penobscot Counties, and nesting in coastal counties from Isle au Haut eastward (probably rare in inland Hancock); wanders from late fall to early spring, some seasons there being a fairly well defined *migratory movement* with birds generally distributed in southwestern Maine. Rarely subject to incursions farther southward.

Migrations. When such movements are noticeable, the southerly flight may begin at any time from October to December. At Brewer, which is close to the breeding range, Eckstorm and Weston have noted the species, usually in small flocks, beginning in late October. In those years when it has been seen in coastal Cumberland County, it usually has appeared the last week in November or in early December, rarely in January. The earliest occurrence for this region is for a bird

that N. C. Brown (1917b) reported seeing on October 27, 1913, at Portland, and the only early November date is for a single bird seen by W. Taber on November 9, 1941, at Scarborough. The return northward occurs chiefly in April and very early May. The latest occurrence at Portland is N. C. Brown's record (ibid.) for April 27, 1913. On May 2 of that year, Eckstorm saw about ten birds at Brewer and collected a female.

Incursions. During the winter of *1916–17*, the species was noted in some numbers from early December into late April in southwestern Maine. It also occurred, in considerable numbers, in Massachusetts and even farther southward (Townsend, 1917; H. Wright, 1917b and 1918). The majority of birds collected at this time appear to have been less than a year old. Beginning in October, *1942*, there was another flight, involving fewer individuals but extending about as far.

Breeding. Maine data indicate that these birds nest in woods where conifers are the chief or only element. Nests have been found, from 15 inches to about six feet above ground, in cavities excavated in rotted cedar and birch stubs, and one in a natural cavity in a cedar. Three nests had linings of plant down and hare fur, moss and deer hair, and moss and hare fur. The size of broods reported in the state indicate four to six eggs per clutch, but it is likely that more sometimes are laid, since elsewhere as many as nine have been reported. Knight (1908b: 612) reported finding two nests ready for eggs in late May, 1908, near Northwest Carry, Seboomook, Piscataquis County. At Dover in the same county, Ritchie (1905) found a nest on June 21, 1904, containing six well-feathered young, "probably a week out of the shell," and from the appearance of the empty nest when visited on July 1, he had no doubt "that the young brood occupied it until within a day or so." In Township 2, Range 3, Somerset County, Bagg (1939) found a nest that contained nearly fledged young on July 2, 1938, and was empty when visited on the 5th. I saw a pair of adults carrying food (insects) on July 4, 1948, at the edge of Ellis Bog in Township 7, Range 13, Piscataquis County. On July 10, 1893, G. W. Hall (1893) found a nest in a spruce forest at Cutler, Washington County, which contained six young birds "a few days old." A brood of six fledged birds was seen on July 15, 1940, at Greenfield, Penobscot County (Weston). On August 3, 1948, I saw a pair of adults feeding three fledged young at Lock Dam, in the same Township as Ellis Bog.

From the above data, plus the observations of Phillip and Bowdish (1919: 43) for the New Brunswick mainland and of Pettingill (1939a: 356) for Grand Manan, it is obvious that this species nests later than the Black-capped Chickadee. Probably the incubation and fledging periods are about the same for both. Ritchie and Bagg noted that

both parents carried food for the unfledged young, which is the case after fledging also. Probably one brood is raised yearly.

Ecology. In summer this species is found most often in moist, shaded places in coniferous woods at lower levels. It is seen less often than the Black-cap in those areas where trees are openly spaced on higher elevations. From late fall to early spring, these birds wander in all types of woodlands, but usually are found searching for insect eggs in the shaded portions of conifers. They are gregarious and social, having been seen in flocks by themselves and often in company with the Black-capped Chickadee and its common associates.

Remarks. In writing of this species in the Umbagog region, Brewster (*in* Griscom, 1938: 601) noted a decline in the summer population in the earlier years of his visits (which began in 1871), and surmised that this was caused by the removal of the primeval coniferous forest. He wrote of collecting specimens, in the first half of June, 1872, which he judged were three or four months old. This carries an implication of late winter nesting. As a matter of fact, the species nests much later (see Breeding), and when Brewster (1878a) described the juvenal plumage of this species, he based his description on an August specimen.

Tufted Titmouse

Parus bicolor Linnaeus

One specimen, in the University of Maine collection, was entered in the catalogue among the accessions for 1890 and the locality given as "Maine." Knight (1898e: 8) stated: "Prof. Harvey is very sure that it was shot near Orono [Penobscot County] by one of the students. At any rate it was taken in the state, received by him in the flesh, and sent thus to S. L. Crosby by whom it was mounted."

Remarks. As a result of having used Oliver Goldsmith's *Animated Nature* (or some work based on Goldsmith) for a source when compiling his list of Maine birds, Williamson (1832: 149) included the *Crested* and the Blue Titmouse of the Old World. Since there are indications that Audubon was familiar with Williamson's list, one wonders about a possible connection between the two in Audubon's statement (1839: 472), which by implication included Maine, to the effect that the Tufted Titmouse was found in "all our Atlantic states, as well as Nova Scotia." Later, Verrill (1862b: 157) listed the species as very rare in Maine, on authority of Audubon.

Family SITTIDAE

Eastern White-breasted Nuthatch

Sitta carolinensis cookei Oberholser

Resident, uncommon on a few inshore islands and the mainland of the southern half of the state west of Penobscot Bay, decreasing to rare elsewhere; *migratory,* nearly absent from the state some winters, and in others occurring uncommonly in York and Cumberland Counties and in smaller numbers eastward into Washington County and on islands, and rarely more than fifty miles inland.

Migrations. The spring movement occurs mainly in April, and the fall movement from about September 10 through October and, rarely, a little later.

Breeding. Few data are at hand. Nests are excavated in the rotten parts of hardwood trees, or natural cavities and woodpecker holes are used, the cavity being lined with fine strips of bark, leaves, hair, and feathers. The same site is used on successive years. Carpenter (1886b: 115) found two nests in old Downy Woodpecker holes in dead birch stubs, apparently in Franklin County. Both sexes aid in excavating, the work often beginning in late March or early April, and requiring ten days to a month. Five to ten, more often six or seven, eggs are laid and full sets may be expected during the first half of May. These statements summarize data in Knight (1908b: 598–599), with additions. It must be remembered, however, that some migration continues until at least the end of April.

Audubon (1834: 300) reported nest building in Maine in late May. Harris found a clutch of six eggs, slightly incubated, on May 16, 1939, in Penobscot County. Brewster (*in* Griscom, 1938: 597) found five fresh eggs on May 20, 1881, at Lake Umbagog; the male was seen bringing food to the incubating female. Norton noted a bird of this species carrying food into a hole in a stump on July 5, 1900, at East Parsonfield, York County. In central New York, A. A. Allen (1929: 430–431) found that both sexes incubate, the period being 12 days, that both feed the young in the nest and for about two weeks afterward, and that about a month after fledging the young cease following the parents. I do not find the fledging period in the literature at hand. Knight (1908b: 599) felt certain that only one brood is raised yearly in Maine.

Winter. In those winters when the species has been noted in the state, very few have been reported at any distance inland. The few far inland records include: one from fall to mid-February, 1943, at a feeding station at Presque Isle (Chamberlain); occurrence on January

2, 1905, at Avon, Franklin County (Sweet, 1906b: 39); one seen on January 22, 1942, at Jackman, Somerset County (Weston); and occurrence on March 18, 1905, at Fort Kent, Aroostook County (Morin *in* Sweet, ibid.). This last might possibly have been an exceptionally early migrant.

Ecology. Although this bird is primarily an inhabitant of mature deciduous trees, feeding up and down the trunks and main limbs, it often is seen in a variety of other places. It has nested in areas where conifers were the chief forest element, at inland localities and even on offshore Monhegan. If they stay about a feeding station, in winter, where food is plentiful, these nuthatches store some food, wedging seeds in cracks in bark. In fall and winter, one to several (most often two) of these birds are seen with wandering bands of Black-capped Chickadees and associates of that species (see p. 387).

Remarks. In the summer of 1879, Batchelder (1882: 109) reported this species as common at Grand Falls, New Brunswick, northeast of Presque Isle. At the latter place during the past 20 years, Chamberlain has seen very few of these birds, all except one having occurred in summer.

I find no evidence of any general trend in population size. The year-by-year fluctuations are not nearly as marked as those of the Red-breasted Nuthatch. In the fall of 1935, the white-breasted species was seen in the Bangor-Brewer region in greater numbers than during the preceding three autumns (Mendall). At Orono, Penobscot County, R. Beaton noted more birds than usual in October, 1939.

Red-breasted Nuthatch

Sitta canadensis Linnaeus

Resident, in varying numbers from year to year (averaging uncommon), breeding rarely as far southwestward as Cape Elizabeth; *migratory,* in some winters most birds leaving the state, and in others many remaining in the southern half and a few in northern Maine.

Migrations. The spring movement occurs from the latter half of March throughout April and, in some years, until about May 10. The fall southward movement, noticed first from late August to mid-September in different years, is most conspicuous usually during the first 20 days of October.

Breeding. Usually the birds excavate a cavity in a rotted stub rather than use a natural one, the entrance being at varying heights. Excavating may be begun in late March, then discontinued till May; in some cases it may be started, then continued more or less regularly

for two or three weeks prior to laying; and in still other cases, the beginning of excavating and the first egg may occur less than a week apart (Knight, 1908b: 602). Pitch is smeared on the tree about the entrance, by both birds, at the time the lining, usually of bark shreds, fine grass, or feathers, is being added. A bird was seen excavating a cavity as early as March 8, 1889, at Orono, Penobscot County, and on May 6 when the nest was opened, three eggs were found buried in the lining (Fernald, 1890). Building was noted as late as May 19 near Eastport, Washington County (Audubon, 1834: 24). An unlined cavity was found on June 4, 1934, at Andover, Oxford County, and the birds deserted it after it was examined (R. F. Miller).

Knight (1908b: 603) stated that four to eight eggs make a clutch. Data at hand on seven sets are: one of three (? incomplete), two of five, three of six, and one of seven eggs. Apparently most clutches are completed the third week in May. The earliest date is for five eggs on May 2, 1889, near Orono (Fernald, 1890: 40), and the two latest are for a set of six, near hatching, on May 23, 1896, in the Umbagog region (Brewster *in* Griscom, 1938: 598), and a set of six fresh ones as late as June 2, 1878, at Little Deer Isle, Hancock County (Hardy, 1878). The female does the incubating and, outside the state, this period has been reported by Burns (1915: 286) as 12 days. Holes dug in nearby trees may be used as roosts by the males when their mates are incubating (Hardy, 1878). At Umbagog, a male was observed feeding his mate by bringing food to the entrance of the cavity and calling her from the eggs with a characteristic note (Brewster *in* Griscom, 1938: 599). Both parents feed the young. Miss Stanwood (*in* Bent, 1948: 26) is of the opinion that fledging requires 18 to 21 days. One brood is raised yearly, the eggs found in late June or early July resulting from disruption of earlier nesting (Knight, 1908b: 604).

Winter. The species occurs in variable numbers (see Remarks).

Ecology. Although primarily an inhabitant of coniferous-forested areas, especially where there are dead trees or a few hardwoods, this nuthatch occurs in winter rather generally in all kinds of trees. It searches for insects in crevices in the bark at all heights from the ground upward. I have found that of the two nuthatches, the present one feeds farther away from the trunk and on smaller branches. It is rather gregarious and social, occurring in small flocks in early fall, and mingling with Black-capped Chickadees and associates of that species (see p. 387) from fall to early spring.

Remarks. People usually have noted times of abundance of this species but seldom the periods of scarcity. Following are the data at hand on population fluctuations. In September, 1881, Hardy (1881), who lived at Brewer, wrote: "Within two years the Red-bellied

Nuthatch is leaving us. I used to see them every day, summer and winter, but have not seen one for a year." From October 17 to 31, 1883, Brewster (*in* Griscom, 1938: 598) found that the Umbagog region "literally swarmed" with these birds, and on October 25, 1885, he wrote: "For the past two weeks the whole country about here has been swarming with them." In the winters of 1888–89 and 1895–96, the species was plentiful in Cumberland County, including Casco Bay islands (Norton), and at the latter season, they were common on Seguin (Spinney). Writing from Gardiner, Kennebec County, in the early summer of 1897, Powers (1897f) stated: "I have not seen a Red-bellied Nuthatch for a year." In the fall of 1899, numbers diminished in southwestern Maine from numerous in November to common in mid-December, and the species was fairly common there all that winter (Norton). They were numerous at Cape Elizabeth in November, 1906 (W. H. Brownson), and common in the Umbagog region in January, 1907 (Brewster *in* Griscom, 1938: 599).

From late September to October 24, 1918, many were seen on Monhegan (Wentworth *in* Jenney, 1919: 31). The species was very common in coastal counties in the winter of 1937–38, and scarce the following winter (several observers). It was fairly common in the southern half of the state in the winter of 1940–41 (several observers). In the fall of 1942, it was abundant, but only fairly common that winter. A few wintered in 1943–44, and the species was fairly common over large sections of the southern half of Maine the following winter. It was rather scarce in the winter of 1945–46, increasing markedly in the fall of 1946, then diminishing through late November and December to only fairly common in early 1947.

On August 24, 1899, Spinney noted Red-breasted Nuthatches hunting for insects along a line of stranded seaweed at Seguin.

At Bar Harbor on Mt. Desert Island, Mrs. E. A. Anthony banded one of these birds on April 5, 1934, and retrapped it on September 24, 1936, April 12, 1937, and December 31, 1937 (M. Cooke, 1942: 113).

Family CERTHIIDAE

Eastern Brown Creeper

Certhia familiaris americana Bonaparte

Resident, breeding uncommonly in coniferous forests in the northern quarter of the state, and rather commonly over most of the remainder, including islands, except diminishing to rare and local in southwestern Maine (to Cape Elizabeth and central York County); *migratory*, in

winter, rare or perhaps often absent from northern Maine, seldom more than uncommon in eastern coastal counties, and varying from decidedly uncommon to infrequently common in different years in coastal counties and islands west of Penobscot Bay.

Migrations. In Cumberland County, the spring movement begins in late March or early April, is most conspicuous from about April 18 to May 8, and continues to about mid-May (rarely to May 20). The few data at hand for the northern section indicate that movement is first noted there after about April 16. In different fall seasons, a decided increase in birds has been noted in Cumberland County from the second to the last week in August. By the third week of the month, the species sometimes is very common in coniferous woodlots there, but probably this is premigration wandering. The general southward shift in population begins in September, is conspicuous all through October and early November, diminishes thereafter, and ends in late November or early December.

Breeding. Nests are at no great height in dead trees, usually conifers that have reached the stage of decay where only a few large scales of bark remain on the trunk. Exceptional sites are: under a loosened piece of cedar on the roof of an old log cabin in Franklin County (Carpenter, 1886b: 115); under spruce bark on the outside of a camp, and one behind a wooden grille, not over six inches from the ground, at the end of the same camp, at Great Pond on Mt. Desert Island (Bond, 1948); two deserted nests, each with three eggs, "behind the shutters of a cabin on an island in the Belgrade Lakes" in Kennebec County (Loveridge *in* Bent, 1948: 61); in a narrow slit in the bark of a dead red maple in the Umbagog region (Brewster *in* Griscom, 1938: 596); and an extralimital record of a nest in a decayed birch stub in the Grand Manan archipelago (Baird, Brewer, and Ridgway, 1874, 1: 127).

Typically, at the site chosen, the lower end of the bark scale curls away from the trunk. Under this roofing the rather bulky, crescent-shaped nest is attached more to the bark than to the trunk. It is made of twigs, debris, fine inner bark shreds, strands of *Usnea*, and sometimes a few insect cocoons, then lined with feathers or fine shreds of bark. The nest is made by the female, who is accompanied by the singing male when gathering and transporting nesting material. (Summarized from Brewster *in* Griscom, 1938: 595–596, with additions). Brewster reported a nest under construction on May 27, 1881, and another on May 29, 1896, in the Umbagog region (ibid.).

Of eleven records at hand for clutches believed to be complete, four are of four eggs each, three of five, and four of six. Judging from the stage of incubation of eggs collected, and from ages of broods found,

most clutches are completed from about May 16 to early June. The earliest actual date, however, is May 29, 1880, for a set of five, near hatching, at Umbagog (ibid. 595). Unhatched eggs and nestlings have been noted on at least six dates in the latter half of June, the latest date for eggs being June 23, 1878, when Brewster (1879b: 203) found a set of four fresh, at Umbagog. According to Brewster (ibid. 207) the female does the incubating. Miss Stanwood (*in* Bent, 1948: 62) estimated the incubation period as 11 or 12 days, which is considerably shorter than that reported for the British race. Fledging requires 13 or 14 days (Tyler *in* Bent, ibid. 61).

At Umbagog, Brewster (1879b: 207) noted that nestlings were fed by both parents; this agrees with the observations of Bond (1948). When a nest was opened on June 3, 1880, at Umbagog, four young flew out, being able to make short flights (Brewster *in* Griscom, 1938: 595), and the same thing happened with about six young on June 17, 1913, at Cape Elizabeth (Meyer, 1913: 588). Since males have been heard singing in Maine from April 11 to the last week in August, and fresh eggs have been found over a considerable span of time, it is very probable that two broods are raised in a season.

Winter. In some years, the number of birds seen in western coastal counties and on islands have not diminished appreciably after the middle of November. This was the case in 1941–42 when the species was common all winter. In other years, however, it is decidedly uncommon in this section and practically absent elsewhere, indicating that most of the birds have migrated out of the state.

Ecology. This species is primarily an inhabitant of mature conifers. At the southern breeding limit in the state, this species is restricted in summer to the soft-wood trees in bogs and to scattered groves of spruce and hemlock. In late summer, when there is considerable wandering, several may be seen in a loosely organized flock. From late fall to spring, the species feeds in all types of woodlands, gleaning small insect eggs or other food from crevices in the bark of tree trunks. At least some of the wintering birds are rather sedentary for periods of several weeks or longer, returning every evening, with almost clocklike regularity, to the same roost. This may be under a loosened piece of bark, in a cavity, or rarely under the eaves of a low building.

Seldom do more than one or two Creepers accompany a wandering flock of chickadees, nuthatches, and kinglets.

Remarks. Data on seasonal fluctuations and general population trends are few, the only information on the latter being for Aroostook County. Here in 1879, Batchelder (1882: 109) found the species common at Houlton and occasional at Fort Fairfield, and Chamberlain has regarded it as irregular and rather rare at Presque Isle during the past 20 years.

Family TROGLODYTIDAE

Eastern House Wren

Troglodytes aëdon aëdon Vieillot

Summer resident, fairly common in some populous areas in western Maine, but rare elsewhere, apparently being absent from large areas in eastern Maine. Probably a rare transient.

Spring. This species arrives about May 12, earlier dates being: April 26, 1857, at Cornish, York County (*in* Hough, 1864: 201); May 6 of unstated year at Waterville, Kennebec County (Bent, 1948: 140); May 8 in the Bangor region (Knight, 1908b: 586; Mrs. P. Hannemann); May 11, 1881, at Bethel, Oxford County (Brewster *in* Griscom, 1938: 592); May 9, 10, and 12, at Presque Isle (Chamberlain); and May 12, 1944, at Brewer (Weston).

Fall. Knight (op. cit.) stated that the House Wren used to remain in the Bangor region until late August. Miss Miller (1918: 25) wrote that she had seen it in the Lewiston-Auburn region, Androscoggin County, as late as September 16, and that it had been reported as occurring there later.

Breeding. There are few Maine data. This wren usually nests in bird houses provided for it and for other hole-nesting species. G. M. Allen (1901: 13) found a nest under an inverted pail on a stump at Caribou, Aroostook County. Smith may have had Maine data on which to base his statement (1882–83: 445) that this wren nests "in holes in trees, etc., and lays from six to nine eggs, in May and June." The male, who often is polygamous, occupies the nesting territory first and carries twigs into houses and cavities there, often blocking the entrances. Later, the female removes part or all of this material from one site, and does most of the work of constructing the nest by adding twigs, grass, and assorted debris, and a lining of hair and feathers. On June 8, 1880, a nest with unstated number of eggs was collected in the Umbagog region, and a nest with seven eggs was taken in early July, 1907, from between timbers of a mill at Upton, Oxford County (Brewster *in* Griscom, 1938: 592). One year at Lewiston, Androscoggin County, an unmated female built a nest in a Bluebird house and laid 12 eggs in it (D. Norton *in* Forbush, 1929: 343).

In Ohio, Baldwin (1921: 244) found incubation, by both sexes, usually to require 13 or 14 days, and fledging not less than two weeks and generally longer. On August 10, 1898, G. M. Allen (1901: 13) found four nearly fledged young in a nest at Caribou, which was mentioned above. Two broods are raised yearly in Maine (C. E. Miller, 1918: 25).

Ecology. This species generally is found in the vicinity of human dwellings, usually nesting in bird houses. It competes to a certain degree with English Sparrows, Tree Swallows, and Bluebirds for these sites. It feeds on insects on the ground and in trees and shrubs at all heights, but usually rather low. It is neither gregarious nor social.

Remarks. Omitting indefinite statements and nominal mention in various lists, the recorded history of this bird in Maine is as follows. Audubon (1834: 453) stated that small numbers occurred eastward into Maine. The species was recorded from Cornish in York County and Brunswick in Cumberland in the spring of 1857 (*in* Hough, 1864: 201). A few years later, Verrill (1862a: 149) reported it common at Norway, Oxford County. In a letter of January 4, 1865, Boardman (1903: 195) stated that the species was rare in the Calais region. It bred in Bangor in 1875, and, in the Portland region, had decreased from common to rare in the few years prior to 1883 (Smith, 1882–83: 445). Apparently referring to Brewer, Hardy (1881) stated that he had not seen a House Wren for ten years, although formerly it had been abundant. This prompted Merrill (1881c) to write that a few pairs had nested in Bangor as late as 1879. At a considerably later date, Knight (1897d: 124) stated that the species had not been observed in Bangor for ten years, and was decreasing elsewhere in Maine; his county records (ibid.; 1908b: 586) show the general scarcity of the species. In 1908, he wrote (p. 394): "There have been no House Wrens about Bangor for at least twenty years, and it is nearly eight years since a House Wren was reported anywhere in Maine." In 1909, two pairs nested in Bangor (Knight, 1909b).

Near our western boundary, Brewster (*in* Griscom, 1938: 592) recorded a report made in 1896, by a man about 60 years of age and a resident of Bethel, to the effect that House Wrens formerly had nested in almost every orchard, but that numbers had diminished to the point where, on an average, less than a pair per season was seen.

There appears to have been a very slight, though definite, increase during the past 25 years, the species having been noted the length and breadth of the state. At the present time, it occurs regularly in some Maine localities, but distribution is very spotty, the biggest gaps being in eastern counties. Several instances have been reported of males arriving at a locality, occupying territories, and blocking the entrances of bird houses with twigs, but no females arrived, and the males left. On June 21, 1945, a House Wren was seen inspecting swallow houses at Calais by J. M. Dudley who reported that this was the first one he had ever seen in Washington County. One was seen at Medomak in Bremen, July 21 to 23, 1947 (Cruickshank), this perhaps being the first recorded occurrence in Lincoln County.

The House Wren must have nested in natural cavities and woodpecker holes before the introduction of man-made bird houses. The species quickly adopted the latter. After the introduction and spread of the English Sparrow, there was competition for these sites in urban areas. In a changing environment, the House Wren population declined. The belief that the English Sparrow won the competition for available nesting sites and thus caused the decrease in House Wrens apparently was mentioned first for Maine by Smith (1882–83: 445), and later more emphatically by Knight (1908b: 394). Forbush (1929: 342) stated that after a decrease in English Sparrows and a campaign to increase bird house building, the House Wren increased in southern Maine and Massachusetts in 1918, but that subsequently the Starling checked this increase by competing in much the same fashion as the English Sparrow had done. Actually, I believe, this wren always was local, though conspicuous, since records began. Consider Brewster's second-hand data on disappearance from orchards at Bethel, where the English Sparrow almost certainly could not have been a competitor.

Eastern Winter Wren

Troglodytes hiemalis hiemalis (Vieillot)

Summer resident, common in coniferous woodlands of the interior of western Maine and rather common elsewhere, except decreasing to occasional within about forty miles of the coast west of Penobscot Bay; *transient,* fairly common in spring and fall throughout; very rare *winter resident* near and on the coast.

Spring. Migration extends from very early April to about May 14 in Cumberland County, and from April 17 probably until well into May in Aroostook. Early arrival dates are: March 28, 1908, at Farmington, Franklin County (Swain *in* Brownson, 1909: 85); April 1 near Bangor (Knight, 1908b: 589); April 2, 1907, at Hebron, Oxford County (Johnson *in* Brownson, 1908b: 50); April 3, 1901, at Farmington (Swain *in* Sweet, 1911a: 53); and April 9, 1945, at Presque Isle (Chamberlain). A bird which may have been a late migrant was seen by Norton on May 26, 1917, at Portland.

Fall. Early migrants have been noted on September 17 in Cumberland County, but usually migration there as well as elsewhere occurs mainly in October. Knight (1908b: 589) stated that "fair numbers" remain until November 15 or 20, but this seems a little late for any numbers, judging from the few recent data.

Breeding. Nests are made near the ground in hollows in stumps, under brush heaps, upturned roots, old logs, and similar places, and

sometimes are suspended from the branches of a spruce or fir as much as ten feet from the ground; sometimes tree nests contain eggs, but more often laying is done in nests near the ground (Knight, 1908b: 591). In Franklin County, the usual site is among the roots of an upturned tree to which large masses of earth cling, the nest being built in one of the recesses in this tangle, but others have been found in the hollow ends of logs and also in holes in dirt banks of ditches beside a traveled road through woodland (Haley, 1925). A nest was found between logs of a dam in Franklin County (Carpenter, 1886b: 115); one inside an abandoned camp near Myra, in Township 32, Hancock County (Tyson and Bond, 1941: 25); and one beneath one boulder that rested on another (Lee *in* Swain, 1907: 3), this last probably in Piscataquis County. Several unlined nests may be found in a small area, probably all made by the male who is more or less active in making these 'cock' nests throughout the breeding season. Spherical in shape, with a small entrance in one side, they are made of green moss and usually the interior is arched over with small twigs. On arrival, the female selects one of these nests and adds a lining; this may consist of dry grass, bits of moss, sometimes a few feathers, and rarely horsehair (Haley, 1925), also feathers and fur of various kinds (Knight, 1908b: 591).

Knight (ibid.) stated that four to ten, usually five or six, eggs make a clutch. None of the few recent Maine records are for more than six eggs or young in a nest. According to Knight, full sets may be found by May 20, occasionally not until early June. A brood of partly feathered nestlings found on May 28, 1939, at Cape Elizabeth (Mrs. F. Lowe) would indicate that clutches are completed occasionally by very early May. Haley (1925) gave June 8 as the usual date for full clutches in Franklin County. Incubation is by the female. I do not find either incubation or fledging period in the literature at hand, but believe that each is probably two weeks or a little longer. The latest egg date is for a set of four found on August 8, 1878, at Houlton, Aroostook County, and recorded by Deane (1879b: 38). A nest containing at least three young was found on August 20, 1906, between Northeast Carry and Norcross (Lee *in* Swain, 1907: 2–3), probably in Piscataquis County. On August 31, 1898, a brood, "scarce able to fly," was seen in the Umbagog region by Brewster (*in* Griscom, 1938: 593). Two broods are raised yearly (Knight, 1908b: 591; Haley, 1925).

Winter. "An occasional individual seen in December, January and February here indicates a possibility of their occasionally wintering in the deeper more sheltered woods near Bangor, and I feel sure that an occasional straggler remains along the coast of Hancock and Waldo Counties" (Knight, 1908b: 589).

One was seen on December 24, 1934, on Mt. Desert Island, by Lunt

and Stupka (1935). One came to a feeding station at Auburn, Androscoggin County, in December, 1938 and January, 1939 (D. Norton).

Ecology. The chief habitat requirement of this species is low cover of various types. The birds dart in and out of brush heaps, tangles of limbs or roots of fallen trees, and crannies in rock piles and stone walls. Although the song is conspicuous, the bird is very shy. In his Umbagog notes for the period May 30 to June 10, 1871, Brewster (*in* Griscom, 1938: 593) wrote: "So shy were they, that we did not take a single specimen, and only once did I get so much as a sight at one." Although occurring perhaps most commonly in swampy coniferous woodlands, the species has nested on islands as far out as Matinicus, and has been seen or heard in summer near the top of Mt. Bigelow and to at least 2,900 feet elevation on Mt. Katahdin.

During migration, the species often is seen in open, deciduous woodlands, as well as in coniferous areas where the growth is more dense. I find no evidence that it is gregarious or social in Maine.

Remarks. Although Boardman (1862: 126; 1903: 300) used the term "resident" when defining the status of this wren, his writings should not be construed as evidence of the wintering of the species in the Calais region.

Josselyn's mention (1674; 1865b: 79) of "*Wrens*" in Maine is a little too general to be considered the first record of this species for the state, but probably he referred at least in part to the Winter Wren.

Eastern Bewick's Wren

Thryomanes bewickii bewickii Audubon

Erroneously recorded. Among birds taken at Seguin on October 6, 1899, Spinney (1903b: 57) reported a "berwicks wren." Norton (1909h: 121) pointed out the error in a review of G. M. Allen (1909), who had listed the bird as doubtfully recorded at Seguin. Forbush (1929: 339) apparently followed Allen in citing this report.

A second report, admitted as doubtful by its author, was for occurrence on October 12, 1918, on Monhegan (Wentworth *in* Jenney, 1919: 30–31). Another report, in a mimeographed journal, of a bird seen on October 21, 1937, at Winnegance, Sagadahoc County, was one of several very questionable reports of occurrence of various species at about that time and place. Yet it has been perpetuated in print by S. A. Eliot, Jr. (1938: 10).

Northern Carolina Wren

Thryothorus ludovicianus ludovicianus (Latham)

Rare *visitant*, and perhaps non-breeding resident, in summer and fall (occurrence from June to November 3) in coastal areas, having occurred in Franklin, Cumberland, Kennebec, Sagadahoc, Lincoln, Knox, and Hancock Counties; *one breeding record* for Oxford County.

Breeding. Knight (1897d: 123–124) wrote: "Mr. J. Waldo Nash of Norway [Oxford County], Me., writes me that he has seen two of these birds there, but unfortunately he did not procure either of them so as to positively verify the record." A later communication from Nash (*in* Knight, 1908b: 585) read: "I have in my collection a set of eggs of this species taken at Norway Lake [now Lake Pennesseewassee, in Norway] in June, 1893, and I saw both birds." These are the only Maine breeding data.

Outside the state this species is known to nest in tangles of brush, in bird houses, and in a large variety of boxes and other receptacles. Four to six eggs usually make a clutch. They are incubated by the female and hatch in 14 days; fledging requires 12 to 15 days. Two, or even three, broods are raised annually.

Other records. Knight (1897d: 123) recorded a specimen in the Hamlin collection that had been taken at Waterville, Kennebec County; although the date was not stated, it probably was taken after 1865, for that was the year Hamlin published his Waterville list, which does not include this species. On June 21, 1916, one was heard singing at Beaver Pond, Township 3, Range 5, Franklin County (Childs, 1916). In 1947, one was seen on July 5 and 6 at Oar Island in Bremen, and on August 10 not far from there at Wreck Island in Bristol, both in Lincoln County and in inner western Muscongus Bay (Cruickshank and others). One was seen and heard, July 9 and 15, and August 9, 15, and 26, 1939, at South Thomaston, Knox County (Mendall). One was seen and heard in July, 1941, at Manset, Mt. Desert Island (J. Cadbury). A male was collected on August 8, 1923, at Dark Harbor, Islesboro, Waldo County (W. S. Brooks, 1924). One was seen from August 18 to October 3, 1908, and collected on the latter date, at Falmouth, Cumberland County (E. Brewer, 1909a and 1909b). One was killed on Seguin on October 6, 1899, and recorded as a "berwicks wren" (see p. 400). One was collected on November 3, 1911, at Portland (Stevens, 1912).

Remarks. This species prefers brushy places and may occur almost anywhere.

In addition to records cited, there are two fall reports, undoubtedly referring to this species but reported as Bewick's Wrens (see p. 400).

More records in recent years are the result of an increase in observers. This bird has been occurring north and east of its regular breeding range over a long period of time, but it cannot survive the periods when snow covers its food and shelter, and so fails to become established.

Prairie Marsh Wren; Long-billed Marsh Wren

Telmatodytes palustris dissaëptus (Bangs)

Summer resident, breeding commonly in one or more localities in Cumberland, Sagadahoc, Kennebec, Lincoln, and Penobscot Counties.

Migrations. On the basis of data from outside the state, it would seem likely that this species arrives in Maine from the second week in May until well into June, and departs in September and the first half of October. The earliest spring date for Maine is May 15, 1932, when Mrs. F. Kittredge observed males present and building 'cock' nests at Cape Elizabeth, and the latest fall date is August 16, 1939, when Cruickshank saw birds at their nests, at Bath, Sagadahoc County.

Breeding. The few Maine data are for nests in cattail marshes. The following data are summarized from Welter's paper (1935) on his studies at Ithaca, New York. The species prefers the narrow- rather than broad-leaved cattails for nesting sites. The male, who is often polygamous, begins constructing 'cock' nests the day after his arrival, averaging about five of these during the rearing of the first brood although some build as many as ten, and sometimes he may have several under construction at the same time. The bulky, spherical 'cock' nests, made of pieces of cattail leaves, grasses, and sedges, are fastened to cattail stalks and each has a lateral or slightly ventral hole for entrance. The female builds a nest similar in size and outside structure, but lines it, first with wet cattail down, feathers, rootlets, duckweed, and various plant materials, then an inner lining of fine shredded plant material, part of which, projecting inward at the lower edge of the entrance, forms a 'doorstep' inside the cavity. Five days are required for the construction of such a nest, during which time the nest has dried out and the lining become felted together firmly. The day after completing the nest, the female lays the first of the five eggs that normally make a clutch.

At Great Pond on Cape Elizabeth in 1932, 'cock' nests were being constructed in the narrow-leaved cattails on May 15 and 18, about a dozen birds and 30 nests in various stages of construction were found on May 22, and a nest contained two eggs on June 6 (Norton, 1933a and personal notes). On June 15, 1939, along the thoroughfare be-

tween Davis and Holbrook Ponds in Holden, Penobscot County, Harris secured one set of five eggs and another of six. On June 16, 1935, at Cape Elizabeth, Norton collected a set of six slightly incubated eggs and a set of five advanced in incubation.

At Ithaca, New York, Welter (1935) found that some late arrivals (females) do not begin building until June 15 or 20, although the largest number of first clutches was completed the first week in June. Incubation was found to begin before the completion of clutches, to require 14 days, and to be by the female only. Feeding is by the female during the 14-day fledging period. The male helps to care for and feed the fledged young, who begin securing some food for themselves when about ten days out of the nest, and the family group remains together for a considerable period. The second brood is raised in a new nest, in the same or a new territory, and the male's urge to make 'cock' nests wanes as the season advances.

Undoubtedly two broods also are raised in Maine.

Ecology. Although this species is known to nest only in cattail marshes in Maine, a few birds have been seen in sedgy places along watercourses. They nest more or less as a group, apparently not because of strong innate colonial tendencies, but rather because the ecological niche which they occupy is decidedly limited. In New York, Welter (1935: 29) found fledged young to be rather gregarious after the breeding season.

Remarks. The basis for inclusion of this species in the early Maine list by Hitchcock (1862: 68) is not known. It was not listed by Knight in 1908. Dr. Anne Perkins (1935) wrote: "Many years ago this bird appeared in our marsh in Berwick [York County], bordering the Salmon Falls River, where I found one of its nests. I have not seen it here since that season." In view of the fact that this wren now breeds in a number of localities that were familiar to ornithologists in former years and where it was not found by them, it seems safe to conclude that the establishment of this species as a regular breeder has occurred since about 1920.

In November, 1923, an old nest was brought to Norton from Cape Elizabeth. He made an unrewarding search among the cattails there in 1924 and 1925. Birds have nested regularly in the marsh about Great Pond on the Cape since at least 1930. In the marsh at Holden, birds first were noted in 1939, and the population was only about eight adults on June 25, 1942 (Eckstorm). Along the Kennebec River, at Bath, Sagadahoc County, quite a number of old and of occupied nests first were noted by Cruickshank in 1939. "The species breeds in fairly large numbers near Bath and in recent years we have found it nesting in the larger cattail marshes of Lincoln County, some nests being

found as far north as Newcastle" (Cruickshank, *in litt.*, 1947). Quite a few have nested at Belgrade, Kennebec County, since at least the early 1940's. On July 26, 1946, I saw a single bird in sedges at Sunkhaze Bog, Milford, Penobscot County.

An extralimital record of interest is for two specimens taken on October 8, 1930, on Grand Manan, New Brunswick, and recorded by A. Brooks (1933: 71).

Short-billed Sedge Wren; Short-billed Marsh Wren

Cistothorus platensis stellaris (Naumann)

Summer resident, breeding in colonies, from about five pairs to over a hundred, and reported from scattered localities in all counties except Cumberland, Sagadahoc, Franklin, Somerset, Piscataquis, and Aroostook, the largest number of colonies and birds being found in southern Penobscot and eastern Washington; migrants, having been seen rarely in Somerset and Cumberland Counties, may occur there regularly, as well as in Franklin and Sagadahoc.

Spring. There are few data. The species has been seen on: May 4, 1904, near Bangor (Knight *in* Sweet, 1905c: 64); May 10, 1944 and May 13, 1941, at Milford, Penobscot County (Weston); May 17 of unstated year near Bangor (Knight, 1908b: 594); May 20, 1940, at Lewiston, Androscoggin County (F. S. Jones); and May 24, 1942 and May 25, 1940, at Milford (Weston). Migration probably continues into early June.

Fall. This wren was seen on October 5, 1944, on Big Heath, Mt. Desert Island (A. E. Brower), and, in the vicinity of Bangor, it remains "until at least October tenth" (Knight, 1908b: 594).

Breeding. The spherical nest is built near the ground, in different kinds of vegetation (see Ecology). "It is said that the male bird builds nests each season, which are not occupied, unless after another nest is deserted for some reason" (Smith, 1882–83: 445). Walkinshaw (1935) found 'cock' nests in Michigan. Four eggs (an incomplete set) were taken June 15, 1938, in Penobscot County (Harris), and seven eggs, about a third incubated, were taken June 20, 1939, at Milltown in Calais (Eckstorm). One nest containing four eggs and another with five were taken in June, 1881, in Penobscot County (Bowler *in* Smith, 1882–83: 445). The nest of this species was found in June, in 1938 and 1939, near Ellsworth, Hancock County (Tyson and Bond, 1941: 26).

The following data, from Mousley (1934), refer to a single pair of birds studied near St. Hubert in the Province of Quebec. No 'cock' nests were located. Probably seven to eight days were required for

building the nest, composed outwardly of narrow strips of cattail leaves, lined with cattail down and feathers, and with a small hole for entrance on the side. After completion of the nest, eggs were laid on successive days until the clutch of seven was completed. Incubation required 14 days, and the female fed the nestlings. On the 13th day after hatching, all young except one left the nest, the remaining one leaving the next day.

Probably two broods are raised yearly in Maine.

Ecology. In the breeding season this species is found in a variety of situations, the general requisite being low dense cover. In Maine they have been reported in: a wet field at Berwick, York County (E. H. Perkins); a bush-covered pasture on Mt. Desert Island (Tyson and Bond, 1941: 26); small to very large sedgy or grassy meadows, marshes, and bogs, at several localities; among very tall sedges near Pushaw Stream, Old Town, Penobscot County; on the floating island type of bog, grown with a mixture of cattails, sedges, and clumps of sweet gale, at Corundel Lake and vicinity in Corinna, Penobscot County (Mendall); and on thick, grassy areas on 'blueberry barrens' in company with Lincoln's Sparrows in eastern coastal Washington County (Bond).

The population of this species in marshes and bogs appears to be very unstable. In spring seasons when the water level in such places is late in receding, the vegetation does not attain the necessary height early enough to provide 'nesting cover' at the appropriate time. In meadows, they apparently prefer a stage in vegetational development so transitory that an area does not remain suited to their needs for more than a very few years. There are several known cases where a few birds have nested in a meadow for only a year or two. On Sunkhaze Bog, Milford, I saw at least 50 pairs of these wrens on June 2,1934; only seven birds were heard singing there on June 2, 1941 (R. Beaton); and on July 26, 1946, I neither saw nor heard a single one of these birds in this extensive and apparently ideal locality. This wren "apparently was completely absent from all its favored haunts in Washington and Hancock Counties in 1947" (Bond). It would appear that some other factor than plant succession or water level changes also is involved in such population changes.

Remarks. Omitting the general statement of Audubon (1834: 453) that this species was abundant from the Carolinas to Maine, the first definite mention for Maine was inclusion in the nominal list of Hitchcock (1862: 68). The basis for such inclusion is now unknown, but probably was based on Audubon. Knight (1897d: 140–141) attempted to discredit Smith's (1882–83: 445) record of breeding in Penobscot County, but later (1908b: 592–593) accepted it.

Since 1933, this species has been reported in sufficient numbers to indicate small to fairly large breeding colonies at about 21 localities in ten counties. The best places to observe these birds in any numbers are: Belgrade, Kennebec County; a number of localities in the southern third of Penobscot County, but especially at Corinna; and east of Cutler and about Calais in Washington County.

The increase in records the past two decades is due, I believe, to an increase of both observers and birds. Observers might keep in mind the possibility of occasionally seeing this bird, during migrations, in the drier parts of salt marshes.

Family MIMIDAE

Eastern Mockingbird

Mimus polyglottos ployglottos (Linnaeus)

Resident, of regular, though rare and local, occurrence, most records being for the mainland within thirty-five miles of salt water, and a few farther inland and on coastal islands; probably breeds irregularly where found in summer (three actual records). Seasonal movements of some individuals are local.

Breeding. The nest is a bulky structure, of twigs, weed stalks, and all sorts of debris, and usually situated in a thicket, vine, or hedge. In 1907, Powers (1907: 52) wrote that 20 or 23 years earlier, a pair nested in Leeds, Kennebec County. Later, in a letter to Norton, he stated that the year was 1885. At Bangor in 1930, a pair nested in woodbine on the side of a house. They were seen carrying food in mid-June and the two young, out of the nest by July 1, stayed with the parents until after August 1. On August 19 the same adults were seen carrying food to another nest. This was loosely constructed, of twigs or bits of bark, 12 to 13 feet from the ground, and was located in bittersweet vines on the same house about 50 feet from the first nest. The nest was empty on August 25 and the following day two young, being fed by both parents, were found in the shrubbery. A third nest, believed to have been used the previous year, was found in the bittersweet vines. (Summarized from B. Brown, 1931). In 1944 a loosely constructed nest was built in a bush at Corinna, Penobscot County, and four eggs were laid in it, but a cat destroyed the nest (Mrs. P. Hannemann).

In a study of this bird made in Tennessee, Mrs. Laskey (1935: 380) found: the nest is built by both sexes; the female incubates the eggs for approximately 12 days; the young are fledged in about 11; some

males assume the task of feeding the fledged young; and five clutches may be laid. Three to six eggs make a clutch (various authors).

The breeding data from the Bangor region, cited above, indicate that at least two broods are raised yearly in Maine.

Ecology. In winter many birds occur singly, although two or three sometimes are reported near each other. Three occurred on Monhegan, September 1 and 2, 1917 (Wentworth *in* Jenney, 1919: 30), and three spent the winter of 1910–11 at Lubec, Washington County (Clark, 1911a). From early October into December, individuals usually appear where they are to spend the winter, and from mid-February to the end of April, they leave the area. Although winter records usually are for urban and suburban areas, where the birds roost in vines and hedges and feed on fruits or such shrubs as barberry and high-bush cranberry or at feeding stations, summer occurrences are for suburban and rural areas. At this latter season they prefer brushy situations. Very few Mockingbirds have been heard singing in Maine. It is noteworthy that summer records are mostly for single birds, which may indicate that pairs have been secretive and so overlooked, or, more likely, that many wintering birds fail to find a mate.

Remarks. This species has an interesting history in Maine. Early reports were believed to refer to escaped cage-birds, and Knight (1897d: 122) went to considerable lengths in attempting to discredit them on this basis. In the *Journal of the Maine Ornithological Society* (vol. 9, p. 48, 1907) there appeared an editorial discounting this persistent cage-bird theory. Since the outlawing of keeping native birds in cages, the tendency has been to consider reports by amateurs as cases of mistaking shrikes for Mockingbirds—especially since both are seen most often in winter.

The first unquestionable record for a wild bird was for one found up the St. Croix River, some distance from Calais, in late 1870 or early 1871, reported by Boardman (1871b). After eliminating reports that obviously refer to the same bird, I find that there remain over 80 for 46 different years in the period from 1871 to 1947. Of these, 67 fall between October 1 and May 1, and at least 17 are for the remainder of the year. Summer records are spread evenly over the decades in this period.

There are 33 records within a ten-mile radius of Portland, 11 for Bangor and Brewer, nine for the Lewiston-Auburn region, six for Augusta-Gardiner-Hallowell, five for Mt. Desert Island, three for Monhegan, and scattered records for other inland and island points. Farthest inland occurrences are: unstated locality in Oxford County; Leeds, Manchester, and Randolph in Kennebec County; and Dexter and Bradley in Penobscot County.

About eight specimens have been collected; another was trapped, banded, and released.

Catbird

Dumetella carolinensis (Linnaeus)

Summer resident, common from southern Oxford, Franklin, Somerset Piscataquis, and south-central Penobscot Counties southward, also in parts of Aroostook County, but rather rare in inland areas of extensive forests, also in Hancock and Washington Counties, and on larger marine islands; *transient,* in spring and fall, in small numbers.

Spring. This bird generally arrives in southwestern counties from May 4 to 18, rarely earlier. The earliest occurrence is for two seen on April 29, 1914, at Brunswick, Cumberland County (Walch, 1926: 68). Early occurrences of interest are: May 2 of unstated year at Lewiston, Androscoggin County (*in* Bent, 1948: 349); May 4, 1908, at Bowdoinham, Sagadahoc County (Robinson *in* Brownson, 1909: 85); and May 5, 1944, at Hampden, Penobscot County (Mrs. P. Hannemann). The species has been seen in western counties in the latitude of Bangor by May 8 in several years, and Knight (1908b: 580) reported arrival at Bangor from May 17 on. Chamberlain has noted its arrival at Presque Isle from May 23 to 30. Migration probably extends throughout May in southwestern Maine, with latest specific date of May 31, 1901, at Seguin (Spinney), and well into June in northern and eastern counties, latest date for the latter section being June 16, 1947, when one visited Machias Seal Island (Canadian territory) and was seen by O. Hawksley.

Fall. Migration is most noticeable during the first 24 days of September, with occasional birds seen thereafter until October 14. Later dates for birds seen are October 17, 1918, on Monhegan (Wentworth *in* Jenney, 1919: 30); October 21, 1911, at Westbrook, Cumberland County (Norton), and November 16, 1916, on Cape Elizabeth (G. Reeves).

Breeding. Although ordinarily nesting in low, dense deciduous growth, Gross (*in* Bent, 1948: 323) reported that they sometimes occupy thick spruces and firs. "The nest is placed in bushes, briers, alders, shrubbery and vines at no great elevation, usually four to ten feet from the ground. . . A typical nest [near Bangor] . . . was composed of fine strips of grape vine bark, fine weed stems, and lined with fine black tendrils and rootlets" (Knight, 1908b: 580). Nest building was observed by Norton on May 28, 1920, at Westbrook. "The male bird helps build the nest, and from seven to eleven days are required for nest construction. An egg is laid each day until the set [usually

four] is completed, and both birds share the duties of incubation. The eggs hatch in thirteen to fifteen days and the young remain in the nest about sixteen days. I have known the male to engage in song while on the nest and keep it up for some minutes at a time. Both parents feed the young, and in July a second brood is generally reared" (ibid.). Various other observers disagree with Knight, giving the incubation period as 12 or 13 days.

Egg records are: a set of three and one of four on May 30, 1887, and two of four on the 31st, at Westbrook (Norton); a set of four on June 2, 1894 (Knight, ibid.); four fresh eggs on June 5, 1939, at Brewer (Eckstorm); bird incubating four eggs on June 13, 1915, of which three hatched on the 27th, at Westbrook (Norton); bird incubating on June 17, 1904, at Avon, Franklin County (Sweet, 1904b); three eggs on June 20, 1921, at Bowdoinham, and three advanced in incubation on June 22, 1888, at Westbrook (Norton). Knight probably was right that a second brood is raised in July, but I lack proof.

Ecology. "It is a species of the low swampy thickets, roadside bushes and brier patches, borders of streams and ponds, and of garden bushes and shrubbery, rarely being found in trees at any elevation" (Knight, 1908b: 580). As this type of deciduous habitat is best developed in river valleys and along smaller watercourses, this is where the largest Catbird populations are found.

Remarks. Audubon (1834: 171) stated that the Catbird was unknown in Maine, but later (1839: 440) cited Brewer as authority for its occurring "sparsely but rather generally" in most of the state. In Audubon's time the species probably was restricted chiefly to the area from the Kennebec drainage westward and southward, where deciduous woodlands were a characteristic feature, and occurred rarely elsewhere. Verrill (1862a: 148) reported the species as very common and breeding at Norway, Oxford County, a hardwood area. In the same year, Boardman (1862: 126) reported it as not very common, but breeding, in the Calais region, where, at the time he wrote, conifers were the dominant feature and lumbering had not yet progressed to the point where hardwoods were a conspicuous element. Batchelder (1882: 109) pointed out that the Catbird was very rare at Houlton, Aroostook County, there having been but a single pair breeding there for several years. He did not find it at all at Grand Falls in New Brunswick, and Fort Fairfield, Aroostook County. The subsequent change in the area has been great, for Kilburn (1922b: 118) reported the species as common along the Aroostook River, and Chamberlain's more recent data are in agreement. There has been an increase in eastern counties, but not as great as elsewhere.

That the species has been noted among alders at numerous localities

well within extensive forests, which are largely deciduous in many areas, would seem to indicate that more Catbirds are present, as well as more observers.

Eastern Brown Thrasher

Toxostoma rufum rufum (Linnaeus)

Summer resident, fairly common, though diminishing in numbers to scattered pairs at the edge of its breeding range, which extends coastwise east to Sagadahoc County, and north to central Oxford, southern Franklin and Somerset, and throughout most of Kennebec, and apparently only a rare *visitant* in Lincoln, Knox, and Hancock Counties and two records for Washington; three *winter* records.

Spring. This species arrives on its breeding grounds from May 1 to 11. A report of occurrence on April 8, 1905, at Skowhegan, Somerset County (Swain *in* Sweet, 1906b: 39) may be a misprint for May 8 or may be an acceptable record. Norton found a dead male as early as April 9, 1911, at Portland. It has been reported as occurring on April 27 of unstated year at Portland (*in* Bent, 1948: 373); on April 28, 1905, at Hebron, Oxford County, by Johnson (*in* Sweet, op. cit.); and several times for Maine on the 30th. Migration probably ends about May 22.

Fall. Most migrants are noted from late August to September 26. Late occurrences are: October 12 and 13, 1918, on Monhegan (Wentworth *in* Jenney, 1919: 30); and in Cumberland County, October 14, 1906, at Portland (Eastman *in* Brownson, 1907e: 71), October 29, 1930, at Cumberland (Rich), and October 30, 1936, at Cape Elizabeth (J. Fanning).

Breeding. There are few data at hand. The loosely constructed and rather bulky nest, of twigs, shreds of vines, and rootlets, is built in brush heaps or low shrubbery. In southern New England, ground nests are common (Bent, 1948: 357). On June 1, 1913, a nest with four eggs was found in a brush pile at Westbrook, Cumberland County, the young hatching either on the 11th or 12th, and on June 20, 1891, four young, about a week old, were found in a nest in the same town (Norton). On July 11, 1909, at Farmington, Franklin County, a pair was seen feeding young (Swain, 1909: 95) that, from the account, apparently were out of the nest when seen. Outside of Maine, incubation has been reported by Bent (1948: 359) as shared by both sexes and requiring 11 to 14 days, and more than one brood is raised annually. Fledging requires 11 days and both parents feed the young (ibid. 359–360).

Winter. There are three records, the first two being for Cumberland County. One was seen on December 21, 1947, at Cundys Harbor,

Harpswell, and "was able to fly but appeared somewhat weak" (E. Dana). From December 22 of the same year until March 28, 1948, one came to Rich's home in Falmouth, where it ate doughnuts, bread, and suet (Haven *in* Gross, 1948b: 73). "For more than a week prior to January 18," 1948, one came daily to a feeding station in Waterville, Kennebec County (Manter *in* Dana, 1948b: 30).

Ecology. This bird is found most often in deciduous thickets, intermingled with trees, in dry situations. The scrubby growth in sandy coastal areas in southwestern Maine, and some areas where oaks grow inland, are favored habitats. Several pairs may be found in a relatively small area in these situations, and none for miles around in surrounding country.

Remarks. This species has occurred rather rarely on the coast beyond Sagadahoc County to Penobscot Bay, and Tyson and Bond (1941: 67) reported two occurrences on Mt. Desert Island. An unusual Lincoln County occurrence was a single bird seen, June 3, 1908, on Monhegan, by F. H. Allen (1908: 98). Apparently the only records for Washington County are: one bird seen on May 25, 1925, at Machias, by F. M. Kilburn, and two at Cherryfield on July 30, 1948, by Weston. Boardman (1903: 195) stated, in a letter written in 1865, that he had never seen the bird in the Calais region. The fourth edition of the *A. O. U. Check-List* (1931: 252) included "northern Maine" in the breeding range, but in over 20 years of field work, Chamberlain has never seen the species in Aroostook County.

Josselyn (1674; 1865b: 79) mentioned "*Thressels*" as good eating. It is possible that he was referring to the Thrasher as occurring at Scarborough in the 1600's.

Family TURDIDAE

Eastern Robin

Turdus migratorius migratorius Linnaeus

Summer resident, varying from numerous in settled areas to unmon in areas of unbroken forest throughout; *transient,* numerous in spring and fall throughout; *winter resident,* sometimes fairly common coastwise, and uncommon through fairly regular at inland localities.

Spring. Birds generally arrive about March 20, and frequently earlier. The earliest record believed to refer to migrating birds is for some seen by Rich on March 9, 1913, at Falmouth, Cumberland County. Occasionally this species does not arrive in the Portland region until after April 1; for example, arrival dates, as noted by Norton, were the 3rd in 1888, the 6th in 1895, and the 5th in 1916.

Fall. Migration is most noticeable from October 8 to November 12, with the largest flocks usually occurring in the latter half of October. Late dates for large flocks are: November 16, 1897, at Seguin (Spinney), and November 17, 1901, at Westbrook, Cumberland County (Norton).

Breeding. Nest sites are so varied that it is difficult to generalize about them, but the more common ones include branches and forks of limbs of deciduous trees and conifers, stumps, fences or fence posts, on beams under bridges, and on shelves or other projections inside and outside of open sheds and other buildings. Usually the nest is from five to 20 feet from the ground, but some are lower and quite often one may be located well up in a tall elm or conifer. Regardless of site and height, however, the nest is rather uniformly constructed, having a foundation and exterior of twigs and straws, then a layer of mud, and a lining of dry grass. The female does most of the work of building, usually spending five to nine days at this task. Construction is often suspended for periods, and Knight (1908b: 637) stated that, if there was a long period of inclement weather, up to 20 days might elapse before the nest was completed.

Clutches usually consist of four eggs. Knight (ibid.) stated that full complements by April 15 were exceptional; actually, I find no records for such an early date. Full clutches have been found by April 28, which is about the time many birds begin nest building. Incubation, by the female, begins after the first egg is laid, and usually lasts 13 days. Fledging requires 11 to 14 days, and both parents feed the young. Outside of Maine, there are reports of fledged young having been fed from ten to 22 days. Two, and sometimes three, broods are raised yearly in Maine, with care of fledged young and the beginning of the next cycle overlapping. Unfledged young have been reported as late as August 25 in several instances.

Winter. Individuals and small flocks are fairly common near the coast during most winters. That the Robin winters in the state has been known since the time of Audubon. More than usual numbers were noted in the Portland region in 1888–89 (J. C. Brown, 1889: 281) and in 1910–11 (N. C. Brown, 1911c), and at Bath, Sagadahoc County, in 1924–25 (Spinney). Well inland, records are for one seen on February 6, 1899, at Jackman, Somerset County (Williams, 1899), two wintering in 1921–22 at Fort Fairfield, Aroostook County (Kilburn, 1923: 36), and several others for different localities. Since the Robin is notably shy at this season, and shows a preference for thick coniferous growth, the species may be more numerous inland than records indicate.

Ecology. This former forest bird has become a common bird of

city lawns and about houses everywhere. In precolonial times, the Robin nested in forests, perhaps mainly in small conifers and other young growth of various kinds which grew in areas burned by lightning fires. At present, large flocks still spend some time in remote woodlands in migration, and some still nest there, principally in young trees in clearings and about abandoned camps, but they occur in greatest numbers in settled areas. It is no longer a shy bird under these circumstances, although many of those wintering are shy and elusive inhabitants of thick stands of conifers. Kilburn (ibid.) wrote: "Woodsmen, both in northern and eastern Maine, have told me of seeing Robins deep in the swamps in mid-winter. It may be possible that they could subsist on buds; I have seen them 'budding' in winter here at Machias [Washington County]."

Early spring arrivals often suffer from cold and lack of food during late snowstorms; at such times they feed extensively on sumac (Mendall). Many wintering birds feed on the fruit of mountain ash.

Remarks. What proportion of the transient Robins seen in Maine are of the northern race *nigrideus* is unknown.

Josselyn (1674; 1865b: 79) mentioned "*Thrushes* with red breasts, which will be very fat and are good meat," as occurring at Scarborough.

I doubt that as many of the wintering Robin reports refer to Pine Grosbeaks as was implied by Knight (1908b: 635).

Newfoundland Robin

Turdus migratorius nigrideus Aldrich and Nutt

Three records. Males were collected by Norton at Westbrook, Cumberland County, on each of the following dates: March 28, 1904; May 10, 1902; and May 17, 1897.

Remarks. These specimens are very good examples of this race. Probably a search would reveal other Maine specimens in various collections, as this race undoubtedly is a spring and fall transient in the state.

Varied Thrush

Ixoreus naevius subsp.

One sight record. One individual, apparently a male, appeared on Monhegan on March 15, 1939, and, after about a week, was joined by a paler individual, presumed to have been a female. The pair left the island some time after the 27th.

Remarks. The identification of these birds is beyond question, for the observer, Mrs. Josephine A. Townsend, drew an unmistakable picture of one, indicating the colors and pattern of the plumage, without suspecting the true identity of the bird. The drawing, with accompanying description, was sent to Miss Eleanor Bore in Portland, thence to Norton who identified the bird, and is before me as I write. An account of the birds was published in a mimeographed newspaper, *Monhegan Press* (vol. 1, no. 47, pp. 1 and 5), on April 28, 1939.

Wood Thrush

Hylociehla mustelina (Gmelin)

Rare in *summer, breeding* records for Oxford, Franklin, and Kennebec Counties, probably having bred in York and Cumberland, and known only as a *visitant* in Somerset, Androscoggin, Lincoln, Penobscot, and Hancock.

Spring. All definitely dated occurrences for earlier than June 1 are as follows: one seen in company with a Hermit Thrush, after a blizzard in late April, 1929, at Lewiston, Androscoggin County (D. Norton); one on May 13, 1947, at West Waldoboro, Lincoln County (F. Bidwell) one on May 14, 1896, at Upton, Oxford County (Brewster *in* Griscom, 1938: 603–604); one seen and heard on May 20, 1942, at Great Pond on Mt. Desert Island (Bond); one noted on May 21, 1909, near Farmington, and another on the 24th at Avon, both in Franklin County (Sweet, 1909) [places and dates for these are confused in a citation by Legge (1910b)]; and one seen and heard on May 25, 1942, at Ship Harbor, Mt. Desert Island (Bond).

Fall. The one occurrence for later than July 27 is Goodale's (1885a) record of a young male collected on September 6, 1884, at Saco, York County.

Breeding and summer. Outside of Maine this thrush is known to build its nest in shaded spots in forks of saplings or on horizontal limbs of trees, usually not over 25 feet from the ground. The external layer of the nest is of grass and weed stalks, usually with bleached leaves, scraps of paper, bark, or straws showing prominently, the next layer being of mud, and the lining usually of dry grass. Three or four eggs make a clutch. Knight (1897d: 129) included among county records for Maine: "Franklin, 'rare summer resident, have taken nest, eggs and bird' (Swain) . . . Oxford, 'have secured two sets of eggs during a period of eight years' (Nash)." On July 1, 1924, a nest containing three young, nearly ready to fly, was found at Oakland, Kennebec County (Mendall). Although these are the only breeding

records for the state, judging from frequency of summer occurrence in York and Cumberland Counties, the bird certainly has bred there.

Outside of Maine, data from various authors indicate that incubation is by the female and requires about 12 days; fledging lasts about the same length of time, both birds feeding the young before and after fledging; and, when more than one brood is raised, the second cycle begins before feeding of the first brood ends.

All other summer occurrences, for the period June 1 to July 27, are as follows: seen and heard on June 19 and 20, 1944, at Great Pond on Mt. Desert Island (Bond); one seen on June 23, 1928, at Webber Pond, Vassalboro, Kennebec County (Mendall); seen and heard in late June, 1939, at Shin Pond Settlement in Mt. Chase Plantation, northern Penobscot County (Tyson and Bond, 1941: 67); and reported, by Robert Beaton, as common in late June and early July, 1941, six miles south of St. John Pond in Township 6, Range 17, Somerset County. Although this last report is unusual, it hardly can be questioned, for Beaton, an experienced observer, knew the bird about his home in Massachusetts. One was seen on July 11, 1941, and for several days thereafter, at Brunswick, Cumberland County (N. C. Nash); the species was "believed heard singing on the Jordan's Pond trail," Mt. Desert Island, on July 19, 1893, as recorded in a manuscript by H. M. Spelman (Tyson and Bond, ibid.); one noted on July 26, 1902, at Avon, Franklin County (Sweet *in* Brownson, 1906f: 97); one collected on July 27, 1865, at Vassalboro (Smith, 1882–83: 426); one heard singing in July, 1942, at Bridgton, Cumberland County where, it was believed, the species nested in subsequent years (Mrs. F. Lowe); and one noted in July, 1947, at King and Bartlett Lake, Somerset County (Bond). There are several vaguely reported occurrences in southwestern Maine for 1947 and 1948.

Ecology. This thrush is an inhabitant of mature deciduous woodlands, preferably where there is some undergrowth, and on dry ground not far from water.

Remarks. Reporting occurrence in the Lewiston-Auburn region in Androscoggin County, Miss Miller (1918: 21) wrote: "Extremely rare; apparently only an accidental visitor. I have never seen this species but during some migrations it has been seen in the country by reliable observers."

Thoreau's (1864) several reports of Wood Thrushes in Maine undoubtedly refer to one of the more common thrushes, probably the Hermit Thrush. The listing of a specimen from Calais by Seebohm and Sharpe (1902: 148) probably was an error, based perhaps on an erroneous label or entry in a catalogue. A report, among migration data in the files of the Fish and Wildlife Service, of five birds seen on October 16, 1921, at Seguin, also is open to question.

Eastern Hermit Thrush

Hylocichla guttata faxoni Bangs and Penard

Summer resident, uncommon to common throughout; *transient,* numerous to abundant in spring and fall; possibly a very rare *winter resident* in southwestern Maine.

Spring. This thrush generally arrives in southwestern Maine by April 15, and rarely during the last few days in March. Early dates are: March 11, 1894, at Westbrook, Cumberland County (Norton); March 28, 1931, at Mt. Desert Island (Mrs. E. A. Anthony); and March 29, 1908, at Portland (Norton). Chamberlain twice has noted this bird on April 12 at Presque Isle, where arrival dates range from this date to May 7. It has been seen as early as April 12, 1940, at Cherryfield, Washington County (Weston). Migration continues until at least mid-May in Cumberland County.

Fall. Migration extends from late September to November 10, with occasional individuals seen even later. The peak of the flight usually occurs in the first half of October. There was a large flight as late as October 26, 1873, in the Portland region, as reported by N. C. B own (1883a), and a few birds were seen migrating on November 14, 1899, at Seguin (Spinney). There are records for single birds to November 26 in southwestern Maine. On December 5, 1927, one flew into a house in South Portland; it was caged and, although it ate well, died three days later (Norton). Several of these thrushes have been found dead in southwestern Maine in early December.

Breeding. The nest is on or near the ground, in very low vegetation such as *Cornus canadensis* or among low blueberry bushes, and often shaded by a small tree or fern (see Ecology). For Ellsworth, Hancock County, Miss Stanwood (1910b: 101) wrote: "The nests are very much alike. The outside of the structure is composed of moss, dead wood, twigs and hay; it is lined with a small amount of black, hair-like fiber, and pine needles. Once or twice the foundation of the nest consisted of more than the ordinary amount of moss. At another time it was made almost entirely of sticks or twigs. Fourteen were lined with pine needles, one with the red fruit stems of bird wheat moss. The proportions of all nests are about the same. The one constructed entirely of twigs was about a half-inch thicker at the top than the others." Knight (1908b: 633) stated that full clutches were found "very rarely" as early as May 1, the more usual period being from May 17 to June 10. Generally three or four eggs make a clutch. According to Miss Stanwood (1910b: 103), an egg is laid each morning until the set is completed. The earliest actual date seems to be for four fresh eggs on May 13, 1896, in the Umbagog region, as reported

by Brewster (*in* Griscom, 1938: 609, 610). Data at hand for 16 sets of fresh or slightly incubated clutches show that they were collected from May 17 to June 9 (12 before June 2) in various Maine localities. Incubation and fledging require 12 days each (Stanwood, op. cit.). Two broods (perhaps rarely three) are raised yearly. Fresh sets of eggs are reported often for the first half of August, and Knight (1909c: 123) reported young leaving a nest on September 8, 1909.

Winter. "I saw a Hermit Thrush at Cape Elizabeth Dec. 25, 1904, and one has been reliably reported in January around the Western Promenade in Portland" (Brownson, 1905b: 28).

Ecology. Stanwood (1910b: 101) wrote: "The Hermit Thrush usually nests in open spaces in an unfrequented wood, beside a wood-road or even a quiet street, and on the borders of pastures skirted by woodlands. The nest is placed, generally, under a low fir tree, occasionally under the tip of a long fir branch, rarely in a clump of ferns. A swamp appears to be a necessary concomitant. Seven nests were located in a knoll, two in a damp hollow, and six just above the swale in the dry earth of a hillside. In almost every case, the slight excavation for the foundation of the nest was made in the loam of a decayed log or stump."

In southwestern Maine, this thrush is a very common nester in the ground vegetation where there are scattered small birches and evergreens in sandy areas. As it is also a common nester in fairly dense undergrowth in mature deciduous and mixed forests in the northern two thirds of the state, a low growth of suitable density seems to be a very important factor in determining its nesting habitat.

"This species is the most common breeding thrush in northern and eastern Maine, especially in sections where the Veery is scarce or absent, also along the coast from Knox County eastward. To me, the Veery is associated with hardwood growths, while the Hermit is more partial to mixed growths—as is the Olive-back. During field work in Washington County I was impressed by the fact that ground cover requirements for the Hermit Thrush and the Woodcock (when in mixed growth) appeared to be almost identical" (Mendall).

In migration this species is gregarious and social, there being many small birds which are migrant associates.

Remarks. In five years at Ellsworth, Miss Stanwood (1910b: 101) found 14 nests and a total of 47 eggs. Only 19 fledglings left these nests, semi-feral house cats apparently having been a factor causing this low number.

From available data it appears that the Hermit Thrush population has increased noticeably during the past 25 years.

Olive-backed Swainson's Thrush

Hylocichla ustulata swainsoni (Tschudi)

Summer resident, fairly common in predominantly coniferous woodlands inland and on the coast and islands, but probably absent from York, southern Oxford, Cumberland, Androscoggin, Kennebec, most of Sagadahoc, inland Waldo, and southern Penobscot Counties; *transient*, common in spring and fall throughout.

Spring. This bird generally arrives in southwestern Maine about May 13, earlier dates being: May 4, 1909, at Farmington, Franklin County (Swain *in* Legge, 1910b: 53); May 6, 1902, at Waterville, Kennebec County (Swain *in* Sweet, 1904c: 80); and a specimen taken on May 11, 1910, at Westbrook, Cumberland County (Norton). This thrush arrives at Presque Isle from May 17 on (Chamberlain). A specimen was taken as late as May 26, 1917, near Portland (Norton), and migration may last throughout the month in that area.

Fall. Migration occurs chiefly in the last three weeks of September. Birds have been noted at Westbrook, which is outside the breeding range, as early as September 3, 1914 (Norton), and the latest date for a bird taken there is October 11, 1902. Swain (1905b: 36) reported two of these thrushes at Dead River, Somerset County, on October 23, 1904. Brownson (1906e: 87) mentioned "several" seen on November 4, 1906, at Cape Elizabeth; this is the latest acceptable fall record.

Breeding. "I have found a considerable number of nests of this species and nearly all of them were located in open mixed growth woods or at the edges of coniferous tracts—usually in wet or moist situations. They almost invariably nest in a conifer at a low elevation, but a nest found in 1937 and one in 1938 were in hardwoods among conifers at rather high altitudes on mountainous slopes in western Oxford County" (Mendall). The nest, commonly placed in spruce trees, is usually three to fifteen feet from the ground. Knight (1908b: 628) reported a nest in a maple sapling surrounded by conifers. He also (p. 629) described a nest as composed of spruce twigs, grass, leaves, fern stipes and *Usnea*, and lined with skeletonized leaves, fern stipes, black rootlets, and *Usnea*.

Three or four (one record of two) eggs make a clutch. "Though full sets of eggs may be found in Maine as early as June sixth, the more usual date is a week or ten days later, and it is not indeed unusual to find fresh eggs in early July" (Knight, 1908b: 629). The earliest date is indicated by Morrell's (1899d) report of finding young, "nearly ready to leave the nest," on June 11, 1899, at Pittsfield, Somerset County. In the same county, at Solon, four eggs were found on May 29, 1904 (Noble, 1904e). Outside of Maine, the incubation period has been reported by Burns (1915: 286) as ten to 13 days. The fledging

period apparently is unrecorded. Although Knight (op. cit.) believed that only one brood is raised yearly, perhaps sometimes there may be a second one.

Ecology. The Olive-back is a bird of conifers, especially spruce and balsam, nesting in the edges of dense stands of young or small trees and less often in stands of somewhat openly spaced mature trees. The species also nests in conifers in mixed woods, and occurs frequently in open hardwoods in migration. (See Ecology under the Hermit Thrush.) This species probably benefitted by the removal of the original forest, since a mixture of conifers and hardwoods provides more edges which are suited to its needs.

Remarks. "I consider the species to be more common in Knox County than in either Hancock or Washington Counties" (Mendall).

Northern Gray-cheeked Thrush

Hylocichla minima minima (Lafresnaye)

Transient, in spring and fall, apparently uncommon but probably often overlooked.

Spring. This bird arrives "about the middle of May" in the Portland region (N. C. Brown, 1882e: 189). The earliest specimen record is for May 18, 1898, at Westbrook, Cumberland County (Norton). There are numerous late May records for specimens. Late captures have been June 1, 1895, in the Portland region (Norton), and June 3, 1872, in the Umbagog region [? Me. or N. H. part] (Brewster *in* Griscom, 1938: 606). There are spring sight records for *H. minima* subsp. from May 16 to June 10 in southwestern Maine.

Fall. Records, based on specimens, range from September 11, 1895, at Westbrook (Norton), to September 30, 1872, in Cumberland County (N. C. Brown). Sight records for *H. minima*, of doubtful subspecific identity, begin in the fall with one for August 28, 1937, at Bremen, Lincoln County (Cruickshank), and extend to October 24. There can be little question that some of these sight records are for the race *minima*, and that it occurs later than September 30.

Ecology. This thrush usually is found in conifers, or in mixed growth where conifers are abundant.

Remarks. Careful observation probably would reveal that this bird is a transient in larger numbers than existing records indicate. Mendall found *H. minima* to outnumber the numerous Olive-backs at Edmunds, Washington County, in the spring of 1937, but in that year only.

Observers should bear in mind that this thrush, as well as the next one discussed, has two color phases, as pointed out by Wallace (1939: 236).

Bicknell's Gray-cheeked Thrush

Hylocichla minima bicknelli Ridgway

Summer resident, fairly common in spruce forests at elevations on the higher mountains inland, limits of distribution not known; *transient* in unknown numbers in spring and fall.

Spring. There are no spring records of captures, but migration undoubtedly occurs in the latter third of May and early June. The earliest date for birds noted singing on Mt. Katahdin is June 16, 1937, as reported by Palmer and Taber (1946: 308), but observers who visit there earlier will probably see, if not hear, this thrush in late May.

Fall. Specimens have been taken in Cumberland County on September 30, 1878 (Norton, 1909d), and October 12, 1913 (N. C. Brown). There are sight records for September 2 to October 2, away from breeding areas, but it seems unwise to cite occurrences for birds whose subspecific identity cannot be settled beyond question.

Breeding and summer. This species has been seen and heard by various persons, in June and July, in scrub spruces on Mt. Abraham in Franklin County, Mt. Bigelow in Somerset County, and Mt. Katahdin in Piscataquis County. An investigation of other mountains undoubtedly would reveal this thrush on quite a number of them. No nests have been found in Maine. The following data are from Wallace's excellent study (1939) of this species on Mt. Mansfield in Vermont. The nest is saddled onto two or more horizontal branches where they join the trunk of a conifer in a dense stand of these trees. The height ranges from three to 15 feet from the ground. Building begins in the first days of June, the nest usually being of twigs and mosses and lined with black rootlets. Three or four eggs are laid, with incubation beginning after the third. Incubation requires approximately 13 days, and fledging the same. One brood is raised yearly.

Ecology. This is a bird of thick stands of low spruces at elevations on our mountains, but also has been collected in mixed woodlands in fall migration.

Remarks. Like typical *minima*, this thrush has two color phases.

Bicknell's Thrushes nest on Seal Island off southern Nova Scotia; one wonders about the migration route of these birds.

Eastern Veery

Hylocichla fuscescens fuscescens (Stephens)

Summer resident, breeding throughout on the mainland, with greatest numbers (fairly common) chiefly in western and central

Maine, diminishing to uncommon and local in northern and eastern counties (locally common near Calais), and rare on some larger inshore islands; *transient*, common in spring and fall throughout.

Spring. This thrush usually appears in southwestern Maine from May 8 to 12. There are earlier dates, to May 1, that appear to be reliable. Two were seen as early as May 10, 1944, at Brewer (Weston), and it twice has been seen on May 13 at Presque Isle, where arrival dates range to the 27th (Chamberlain). The duration of migration is unknown.

Fall. This species leaves early, most birds usually having departed by the end of the first week in September. One was shot on September 11, 1895, at Westbrook, Cumberland County (Norton). Later sight records are: September 18, 1909, at Portland (Eastman *in* Legge, 1910c: 70); September 18, 1945, at Cape Rosier, Hancock County (M. and R. Emery); and September 20 of unstated year (Knight, 1908b: 623), probably at Bangor.

Breeding. Knight (ibid. 625) wrote: "The nests are often placed on top of the . . . [stump] of a small tree around which the sprouts have started at heights of not over six feet from the ground. Other nests are placed in small evergreen bushes, in low alders and on dead stumps, in general two or three feet from the ground." Nest building has been observed in late May on several occasions. Knight (ibid.) stated that a week to ten days was required for building. Four eggs usually make a clutch. Two were found on June 1, 1905, at Augusta (Noble, 1905c), and four on June 2, 1888, in Franklin County (J. P. Norris, 1889); the latter eggs were spotted, which is unusual. There are numerous other records for fresh or slightly incubated sets to June 11, and the latest date at hand for unhatched eggs is for four on July 1, 1890, found by Norton at Westbrook.

Outside of Maine, the incubation period has been reported as ten to 12 days (*in* Forbush, 1929: 390). The fledging period probably is about 12 days. Late sets of eggs probably are the result of earlier ones being destroyed; there is no evidence that two broods are raised yearly in Maine.

Ecology. "Their favorite haunts are bushy thickets by the roadside and about the shores of ponds and streams, dense second growth beeches, swampy alder thickets and hardwood or mixed woodlands. They are generally entirely absent from the thick, deep, dense evergreen woods, and I have failed to find them on the wooded islands along the coast" (Knight, 1908b: 624). Bond stated, in a letter, "I usually find the Veery in *wetter* situations than the Hermit Thrush. In eastern Maine it seems most numerous in alders and thickets bordering rivers (e. g. Dennys River, Washington County). It is common in alder swamps bordering the Bangor Bog."

Remarks. Four spring records for the Veery, from April 17 to 26, have appeared in the *Journal of the Maine Ornithological Society.* Since this bird arrives later than the Hermit Thrush, it seems likely that these were misidentified birds of the latter species. Likewise in fall, there are six published sight records, for October 1 to 25, and additional unpublished reports to November 8. These might refer to birds whose departure was delayed because of some injury, or to misidentified birds.

At the present time I have no data on the possible occurrence of the races *salicicola* or *fuliginosa,* both of which currently are recognized by the A. O. U. Committee. A careful search in collections might reveal birds which are referable to either one or the other of these northern races.

Eastern Bluebird

Sialia sialis sialis (Linnaeus)

Summer resident, common in southwestern counties east to the Penobscot River and north to about an imaginary line drawn from south-central Oxford County to south-central Penobscot, and decreasing to regularly uncommon in northern and eastern counties; *transient,* in spring and fall, in unknown numbers (probably fairly common); rare in *winter,* with records for all months except December.

Spring. The Bluebird is seen regularly by March 20, and quite often by the 10th, in southwestern Maine. The species was seen on March 3, 1902, at Waterville, Kennebec County (Swain *in* Sweet, 1904c: 80); two on March 4, 1945, at Brunswick, Cumberland County (R. Biette); and there are several occurrences each for March 5 and 6. In 1895, the first arrival was not noted until April 4 at Westbrook, Cumberland County (Norton), but the population was then very low (see Remarks).

Fall. Migration is most in evidence from September 20 to October 25, with birds occasionally seen in southwestern counties until November 7, and rarely to the 17th.

Breeding.[1] Knight (1908b: 643) stated that this species prefers to nest in settled areas, with nesting sites generally "in almost any suitable natural or artificial cavity, either about buildings or holes in stubs along . . . highways and about lakes." The cavity is lined with straw or similar material, and often a few feathers are added, both sexes working at nest building. Knight (ibid.) mentioned an instance where building was completed in three days. For the Portland region, N. C. Brown (1882f: 4) wrote that the first nest was constructed "about April 8–15, the second about June 1."

[1] Robinson's (1928) data were found too late to include here.

All records at hand for completed clutches are for four or five eggs. On April 18, 1925, a nest was completed and two eggs laid, at Manchester, Kennebec County; the third egg was laid the next day, and all froze that night in the severe cold accompanying a snow storm (Mendall). Norton noted a bird, evidently incubating, on April 21, 1903, at Westbrook. For the Bangor region, Knight (op. cit.) reported full clutches as early as April 24, and eggs hatched by May 8. For Brunswick, Cumberland County, Walch (1926: 70) wrote that nesting dates ranged "from April 28 to July 11, each of these being the date the first egg was laid." Knight (1908b: 643–644) wrote: "The parents take turns in incubating and the eggs hatch in twelve days, the young leaving in fifteen days after they are hatched." Records indicate that the second clutch is laid from early June to early July.

Winter. During a protracted period of mild weather, a Bluebird was seen on January 26, 1919, at Falmouth, Cumberland County (Rich). Single birds have been seen on February 7, 1921, and during the last days of the month, at Lewiston, Androscoggin County (C. E. Miller). One was seen on an unstated date in late February, 1925, at Gorham, Cumberland County (R. Whelden). The species was seen on February 28, in 1902 at Livermore, Androscoggin County (Briggs *in* Sweet, 1904c: 80), and in 1929 at Portland (Norton).

Ecology. The Bluebird's haunts are farmlands, orchards, and roadsides. Though mainly insectivorous in summer, in spring and fall these birds have been seen eating fruits and berries.

Remarks. Several early writers have shown that the Bluebird was a rare summer resident east of the Penobscot River and in northern counties. The species, now uncommon in these ares, seems to have been slow in occupying cultivated sections in these parts of the state.

A severe cold wave in January and February, 1895, in the Carolinas and other southern states, was very destructive to birds wintering there. In the summer of 1895, Bluebirds were rare throughout Maine although a few individuals or pairs were reported from several localities. At Westbrook, none was seen except in migration (Norton). There was only one pair at Brewer (Hardy, 1895). In 1896 an increase was noted, with spring arrival dates listed for eight localities (*in* E. H. Norton, 1902), although the species was absent that summer from many of its former haunts, as, for example, at Farmington, Franklin County, as reported by Swain (1896b). In 1897, a further increase was noted, at Gardiner, Kennebec County, by Powers (1897c) and Larabee (1897: 6), at Farmington by Gay (*in* Powers, 1897g), at North Bridgton, Cumberland County, by Mead (ibid.), and near Waterville, by Bates (ibid.). By 1900, recovery seems to have been complete.

There has been a slow decrease in the population in southwestern Maine for several decades, also noticeable year-to-year fluctuations. Factors involved in the overall decline seem to be competition with Starlings and other birds for nesting sites, and perhaps a decrease in the number of orchards. The weather seems to play the dominant role in short-time fluctuations.

Greenland Wheatear

Oenanthe oenanthe leucorhoa (Gmelin)

Hypothetical. Of several sight records at hand, only two seem worth recording. "A Wheatear was seen at close range (within ten yards) on Cadillac (or Green) Mountain [on Mt. Desert Island], September 1, 1913, by Dr. C. P. Alexander and Dr. William C. Woods of Kent, Connecticut. The record is so unusual that it must be regarded as hypothetical" (Bond). "Both observers recognized the bird and followed it about for some time, approaching as close as 25 feet" (A. E. Brower). In January, 1934, a "music teacher in Vassalboro [Kennebec County], had a bird in her yard about half an hour, which she described to me as being smaller than a Robin, with white on head and upper part of tail, and with wings and tail black. It was feeding on the ground. The description seemed to fit a Wheatear better than anything I could think of" (E. H. Perkins).

Remarks. Knight (1901) stated that two specimens from New Brunswick, one from Indian Island near Eastport, Maine, and the other from Grand Manan, had been accredited to Maine.

Family SYLVIIDAE

Blue-gray Gnatcatcher

Polioptila caerulea caerulea (Linnaeus)

Rare *visitant*, about 15 individuals having been noted (April 18 to October 6), from 1878 to 1948, on Monhegan, and in York, Cumberland, and Hancock Counties.

Records. All acceptable records are listed chronologically by year. In Cumberland County, one was shot in summer [1878], one seen on August 19, 1880 (N. C. Brown, 1880), one seen on April 18, 1896 (N. C. Brown, 1896b), all at Cape Elizabeth, and one seen on August 25 and 26, 1912, in Portland (N. C. Brown, 1912b). Single birds were reported seen: on Monhegan on September 5, 1915, and on August

30, 1916, by Warner Taylor, and in 1917, on August 20 and 22, and on the first two days and the 11th of September (*in* Jenney, 1919: 31–32); on September 11, 1917, at Deering Center, Cumberland County, by Gertrude Morse; on September 11 and October 6, 1918, on Monhegan (ibid. 32); on May 28, 1924, at Gorham, Cumberland County, by Mrs. H. Lombard, and (two birds) on October 2, 1925, at Ogunquit, York County, by Mrs. H. W. Rice and Mrs. H. L. Hillman (Forbush, 1929: 384); on August 28, 1946, between Seal Harbor and Bar Harbor, Mt. Desert Island (W. Wharton); on May 14, 1947, in Evergreen Cemetery in Portland (Campbell *in* Gross, 1947d: 28); and on September 14, 1948, at Scarborough (Webb *in* Gross, 1948b: 73).

Remarks. Since this species is increasing on the Atlantic seaboard and has attempted nesting as near to Maine as southern New England, more occurrences in the state may be expected.

In the spring of 1947, one was seen on Campobello Island, New Brunswick (Squires *in* Gross, ibid.).

Eastern Golden-crowned Kinglet

Regulus satrapa satrapa Lichtenstein

Summer resident, fairly common within about fifty miles of the coast and on islands west of Penobscot Bay, in somewhat lesser numbers eastward, and uncommon elsewhere; *transient,* common in spring and rather numerous in fall near the coast; *winter resident,* varying in different years from few to common near the coast, and perhaps absent from the northern half of the state.

Spring. In Cumberland County, migratory movements first are noted in late March, but are most pronounced from April 10 to May 5. From available information, it appears that these dates are about the normal limits of migration elsewhere in the state.

Fall. Migration is in evidence from about September 5 to the first week in November, usually being most noticeable in the second week of October.

Breeding. "In the nesting season an occasional pair will nest in a small grove where there are scarcely a dozen trees of pine or other evergreens, but to be sure of finding them nesting they must be sought in the deeper more extensive woods" (Knight, 1908b: 614). At Ellsworth, Hancock County, Miss Cordelia Stanwood found a number of nests of this species in black spruces, and three others, believed to be theirs, in a single white pine. Nests are reported at various heights, from 40 to 50 feet at inland localities and "not over twenty feet up, on an average" along the coast (ibid. 615), from 15 to 25 feet in the

vicinity of Ellsworth (Stanwood), and one at about six feet near Bangor (Merrill, 1881b).

Knight (op. cit.) described the nests as being pensile or semi-pensile, and composed of "green mosses, lichens, usnea, fine soft bark and rootlets, lined with feathers. Though sometimes on or against a big limb, they are more generally supported by several small twigs which are woven into the nest near the top of it." Nests found by Miss Stanwood were semi-pensile, pouch-like structures, made of a few twigs, pieces of green moss (usually *Hypnum*), lichens gathered from the trunks of gray birches, being lined with grouse feathers and the fur of the snowshoe hare and red squirrel, and located on the underside of branches near the tips. Photographs by Miss Stanwood, one of a nest in its natural setting and the other of five well-feathered young, are reproduced in Forbush (1929: opp. p. 378). Carpenter (1886b: 115) described a nest, partly pendant from the branch of a hemlock "at the edge of a forest", which was lined with grouse and Canada Jay feathers.

In black spruces in woodlands near Ellsworth, Miss Stanwood found nests in various stages of construction on dates, as follows: one about half done on April 14, 1921; the outside of one finished on April 25, 1911; a mere beginning of twigs and green moss on May 5, 1916; three apparently finished on May 15, 27, and June 4, 1910; and lichens being added to outer shell on May 16, 1919. She noted that the female constructed the nest and, on trips to gather material, was accompanied by the singing male, and that building required considerable time—at least nine days in one instance.

Size of clutches (seven to ten eggs) is shown by the following data on eggs and young. It should be borne in mind that some of these may be for second broods: nine or ten eggs and young in the same nest on June 2, 1896, in the Umbagog region (Brewster *in* Griscom, 1938: 603); nine fresh eggs on June 3, 1941, on Mt. Desert Island (Harris); ten young in a nest on June 15, 1919, and on June 22, 1921, and eight on June 21, 1916, near Ellsworth (Stanwood); nine eggs on June 24, 1903, at Lubec, Washington County (Clark, 1905a: 24); eight eggs, in the U. S. National Museum, collected by C. H. Morrell on June 25, 1897, at Pittsfield, Somerset County; seven young [in nest] on July 3, 1941, on Mt. Desert Island (R. Miller, 1941: 136); and ten eggs on unstated date, probably in 1876, near Bangor (T. M. Brewer, 1879a).

Data from Brewster, cited above, and from Miss Stanwood's notes show that all eggs of a clutch do not hatch at about the same time, hence incubation must begin before the set is completed. The incubation period is unrecorded in the literature at hand. According to

Miss Stanwood, the female performs this duty, and both parents feed the young, first by regurgitation, later on crushed and macerated insects, and finally on large insects. The fledging period also is unrecorded, but judging from Miss Stanwood's observations, especially those on partly grown young taken from nests and reared to fledging age in captivity, it must be rather long—perhaps nearly three weeks. Two broods yearly would seem to be the rule. Not infrequently, adults feeding fledged young may be seen in late August. "As late as the middle of September, in 1912, I saw mature kinglets industriously feeding a large family of young birds" (Stanwood).

Winter. Numbers vary considerably from winter to winter; during some seasons, almost all birds withdrawing southwestward out of the state.

Ecology. "At all seasons their chief preference is for the evergreen woods and groves. Pine, fir, spruce and hemlock woods, or mixed growth in which these trees predominate are their preference. Occasionally they venture into the orchards in fall and are fairly often found in white birch woods, but to be sure of finding them one must seek in the evergreens. Here they feed on the insects and insect's eggs carefully gleaned from the foliage and branches, while an occasional insect is sallied after and caught on the wing" (Knight, 1908b: 614). In her notes for September 12, 1908, Miss Stanwood recorded that many of these kinglets feed on the small green worms with which gray birches are covered, and that they devour vast quantities of spruce-bud moths. The species usually feeds in the higher, well-lit portions of the trees, flitting among the branches, now appearing out at the tips, then disappearing into the shaded portions near the trunk.

For a 30-acre tract, mainly of mature red and white spruces, on Hog Island in Bremen, Lincoln County, Peterson (1942: 28) gave the number of nesting pairs for six years (1936 to 1941) as 4, 4, 7, 8, 9, 10. He suggested that the increase noted in this one area might give a clue to the heavy flight of kinglets that went southward in the fall of 1941.

This gregarious species starts flocking in August when two or more family groups, containing fledged young still being fed, join company. Migrant associates include the Ruby-crowned Kinglet, chickadees, Brown Creeper, nuthatches, and Downy Woodpecker.

Remarks. A record for northern Maine is Carpenter's (1886b: 115) report of an incomplete set of five eggs taken on unstated date at Caribou, Aroostook County.

Of these birds in the Umbagog region, Brewster (*in* Griscom, 1938: 602–603) stated that as breeders, they were common in 1871, rather rare in 1872, and uncommon thereafter, and as a transient,

abundant until 1896, when there was a decrease, and fewer numbers were noted to the end of his visits in 1909.

I found this species to be fairly common in the summer of 1945 in the Magalloway region north of Umbagog.

"One year this kinglet may be common, another year it is rare, even in migration. They were numerous in Hancock County during the severe winter of 1906–07" (Stanwood). This species was by far the most abundant bird on Appledore Island, Kittery, York County, on October 5, 1937; literally thousands were present (P. L. Wright, 1937a: 37).

Eastern Ruby-crowned Kinglet

Regulus calendula calendula (Linnaeus)

Summer resident, status not well known, but apparently uncommon throughout; *transient,* fairly common in spring and fall; two *winter* records.

Spring. This bird usually is reported from scattered localities by April 21, dates earlier than the 16th being exceptional. Two were seen on April 5, 1939, at Great Head on Mt. Desert Island (Mrs. E. A. Anthony); migrants have been noted on April 10 and 13 at Presque Isle (Chamberlain); one was shot on April 13, 1863, in the Calais region (Boardman, 1907: 95); and the species was seen on April 13, 1911, at Ellsworth, Hancock County (Stanwood *in* Sweet, 1911b: 66). Occasionally, as in 1904, this bird does not arrive at Portland until after May 1 (Norton). Migration apparently ends in southwestern Maine by May 17.

Fall. Flocks begin wandering by mid-August, but there is no general southward movement until the last week in September, and the last birds usually have departed by October 20. There are several October 22 records for western Maine, plus these later ones for the state: October 25, 1911, at Phillips, Franklin County (*in* W. Cooke, 1915a: 124); October 26, 1941, at Livermore, and October 27, 1922, at Turner (Mrs. C. A. Poole), both in Androscoggin County; November 4, 1942, at Scarborough (Norton); and November 7, 1883, at Brewer (Hardy).

Breeding. There are few data for Maine. On May 31, 1897, Knight (1908b: 617–618) saw a bird building a nest that on June 15 was ready to be lined, but it was deserted when next he visited the site on the 24th. It was located about four miles from Orono, Penobscot County, and placed in a large spruce "near the end of a limb, about eight feet from the main trunk and about twenty-five feet from the ground. It was supported by a number of small twigs which drooped from the

limb and was directly under the limb. It is composed of mosses of the various sorts that grow on tree trunks mixed with lichens of the genera, *Cladonia*, *Parmelia* and *Usnea*. Viewed from a distance of a few feet it looks like a green ball of moss. The interior is composed of *Usnea longissima*, closely interwoven and intimately mixed with feathers and small quantities of moss. The lining is not completed."

Outside of Maine, five to ten eggs are reported per clutch. In Nova Scotia, Austen (1892) reported finding eggs and small young in June, and a bird, robbed of two nests, having three eggs in her third nest by July 5; among sets he took were two of six and one of seven, evidently completed clutches. I do not find the incubation or fledging periods recorded in the literature at hand. (Knight, 1908b: 619) saw a pair of adults feeding ten recently fledged young in early August near Fort Kent, Aroostook County, and since there are similar reports of young being fed from late June into August at different localities in the state, it is probable that more than one brood is raised in a season.

Winter. A somewhat dried and decomposed specimen was found on January 13, 1916, at Falmouth, Cumberland County (Norton, 1916: 383). In late February, 1940, one was found dead at Brooklin, Hancock County (A. F. Bemis). (See Remarks.)

Ecology. "In spring the Ruby-crowned Kinglet is found in swamps of cedar or fir, but during the fall migration it is found in more open places, and shows a decided preference for alders. After the leaves of most trees have fallen, it is often seen or heard in the dense bushy tops of young apple trees" (Sweet, 1906a: 30). The summer habitat is mainly in conifers. According to Bond, the species "seems to prefer black spruce growth about the borders of *Sphagnum* bogs, but also is found in deep woodlands." Associates have been listed under the preceding species.

Remarks. According to Bond, this species is more numerous in summer in Washington County, particularly in the Jonesport region, than it is in Hancock. Mendall agrees with this statement.

This kinglet fluctuates considerably in numbers from year to year in migration. It is hard to estimate the extent of these changes, for during some seasons, migration is fairly condensed in time, and during others, it is much spread out.

On July 22, 1941, one was seen feeding a young Cowbird at Scarborough (Holt, 1942).

Alleged occurrences in late December, 1905, near Farmington, Franklin County (L. M. Tufts, 1906), and on March 30, 1908, in the Portland region (*in* Brownson, 1909: 85) may have been misidentified Golden-crowns.

Family MOTACILLIDAE

American Water Pipit

Anthus spinoletta rubescens (Tunstall)

Transient, in spring chiefly inland and in fall chiefly coastwise; rare *summer resident* on Mt. Katahdin, and one other summer record.

Spring. Migration occurs chiefly from May 5 to 22. The earliest record is for May 2, 1903, at Castine, Hancock County (Ridley *in* Sweet, 1905a: 44), and the latest June 1, 1907, at Lubec, Washington County (Clark, 1907a: 78).

Fall. The southward flight passes through Maine from about September 10 to early November, most birds being seen in the latter half of September and first three weeks of October. The earliest fall record is for a single bird seen on August 10, 1898, at Seguin (Spinney). Late records include a flock of about ten seen on November 8, 1915, on Matinicus Island (W. L. McAtee), and a single bird shot on December 13, 1901, at Seguin (Spinney, 1902b: 45).

Breeding and summer. Occurrences at Katahdin for this season have been summarized by Palmer and Taber (1946: 308–309), who also gave the known facts about the finding of a nest, believed to have been of this species, on July 10, 1939. In late August, an unhatched egg was removed from the nest. In a letter, dated September 9, 1946, Bond wrote: "I have the famous Katahdin 'Pipit's' egg here at the moment. Last Monday I showed it to James Gillin, one of the leading oölogists of the country. Without telling him where it came from or giving him any other clue, he declared immediately that it was a Pipit's egg. I see no reason why this record should be questioned." Several persons tried to find Pipits on the mountain in 1946, with no success. In 1947, "it wasn't until June 14 that I saw the first Pipits this season—five in a flock, between Hamlin Peak and Caribou Spring" (H. Dyer). Apparently occurrence there in summer is irregular, and breeding a rare event.

The nest of this bird is made of grass and placed in a depression in the ground, in a cavity sheltered by a rock, or well inside a rocky crevice. Early June would seem to be the proper time to search for nests above timberline on Katahdin, since Pipits have been seen traveling in pairs in Maine as early as May 4. Very little is known about the breeding habits of this bird.

I saw a single bird, in flight, at close range and heard its characteristic call on July 26, 1946, at the mouth of Sunkhaze Stream on the

Penobscot River, Milford, Penobscot County. Though unlikely, this could have been an early migrant.

Ecology. The summer habitat in Maine is above the timberline on Mt. Katahdin. Fall transients, in flocks, are seen on barren rocky places along the coast, on sandy beaches, in stubble fields, and on ploughed fields. Spring flocks occur chiefly in large open fields or in extensive gardens that have not been ploughed since the previous year.

Remarks. It is interesting that in southwestern counties in the 1890's and later, large flocks, sometimes numbering about 500 to 1,000 birds, were seen migrating along the coast in fall until late in October. An absence of such records for over 25 years indicates a change either in migration route or in numbers rather than a lack of observers. The numbers occurring inland at this season are quite variable, but comprise only a fraction of the number along the coast.

In spring the flocks are small, usually from about ten to 50 birds, and are seen mostly at inland localities. N. C. Brown (1882e) commented on the lack of spring records for these birds in Maine, and Knight (1908b: 576) wrote of them as "very few and far between," but the latter seems to have overlooked a number. Chamberlain, who formerly saw this species quite regularly in spring and rarely in fall at Presque Isle, saw none at all from 1939 to 1946. Even so, it seems justifiable to conclude, from other available data, that Pipits have become decidedly more common in spring since about 1900.

For comment on the "*Wag-tail*" of Josselyn (1674), see page 488.

An extralimital record of interest is for two birds seen by Mendall on July 20, 1937, near the summit of Mt. Madison in New Hampshire (Palmer and Taber, 1946: 309).

Family BOMBYCILLIDAE

Greater Waxwing; Bohemian Waxwing

Bombycilla garrula pallidiceps Reichenow

Incursion visitant (November 17 to May 29), usually occurring in flocks; doubtful reports of summer occurrence.

Incursions. The number of birds involved in these movements varies greatly. In the following list, many early and some recent indefinite reports of occurrence have been omitted.

1868. "Chatterers" seen on November 17 at Milltown, New Brunswick (Boardman, 1903: 240). Apparently some of the birds noted in this and/or the two following years, also were seen in adjacent Washington County, as implied by Boardman (*in* Knight, 1908b: 463).

1870. Same as above on November 21 (Boardman, 1903: 206).

1878. Same as above prior to February 6 (ibid. 246).

1896. One shot on December 19 at Warren, Knox County (Kalloch, 1922: 11).

1908–09. Flocks seen from December 6 to January 3, and reappearing on February 6, at Lubec, Washington County (Clark, 1909a); unstated numbers from mid-February to March 11 near Bangor (Knight, 1909a); and three on March 1 at Augusta (Brown *in* H. Wright, 1921: 72).

1914. One seen on April 3 at Westbrook, Cumberland County (Norton *in* H. Wright, ibid.).

1915–16. One seen in late November at Norway, Oxford County (Mrs. A. Park); two seen on January 8 at Bangor (Brown *in* H. Wright, ibid.); and one seen "in 1916" at Southwest Harbor on Mt. Desert Island (Tyson and Bond, 1914: 68), probably referring to this winter.

1918–19. Small flocks seen at Fort Fairfield and Presque Isle, Aroostook County (Kilburn, 1922b: 118); 23 birds on January 6 and seven on the 13th, reported by Waterman, at Auburn, Androscoggin County (*in* H. Wright, 1921: 67); seven on January 25 and five on February 8, reported by L. Lombard, at Gorham, Cumberland County (ibid.); five on February 16, 17, and 21, and a larger number later, remaining until at least March 30, reported by Brown, at Bangor (ibid. 67, 70); one on March 6, reported by Abbot, at Bryant Pond, Oxford County (ibid. 71); and one on May 29, reported by Brown, at Northport, Waldo County (ibid. 67).

1919–20. Small flocks seen at Fort Fairfield and Presque Isle (Kilburn, op. cit.); five on January 11 and three on the 18th at Gorham (L. Lombard); eight on January 26 and to February 29 at Belfast, Waldo County (E. Brown); and two in February near Lewiston, Androscoggin County (C. E. Miller).

1920–21. Small flocks seen at Fort Fairfield and Presque Isle (Kilburn, op. cit.).

1925–26. A flock of about 25 seen at Presque Isle (Chamberlain), and one seen from January 19 to 21 at Saco, York County (S. Abbott, 1926: 165).

1930. One seen from January 26 to February 17 at Auburn (D. Norton).

1931–32. Unstated number at Machias, Washington County (F. Kilburn), and a large flock from November 24 to 30 at Bar Harbor, Mt. Desert Island (Tyson and Bond, 1941: 68).

1933. A flock of about 25 seen on April 16 and 17 at Fryeburg, Oxford County (H. Abbott).

1937. Five seen on March 15 at Bar Harbor (Tyson and Bond, ibid.).

1939. One seen on April 25 at Livermore Falls, Androscoggin County (Ida Hendrick).

1947. A flock of 20 to 25 seen the last week of January and on February 10 at Auburn (D. Norton *in* Gross, 1947b: 13), and unstated number seen on March 17 at Lewiston (Waterman *in* Gross, 1947f: 34).

Ecology. This bird usually stays in the same area for some time, feeding on frozen apples that remain on the trees in winter and on the fruit of mountain ash. It is social as well as gregarious and, when present in small numbers, often associates with flocks of Cedar Waxwings or Pine Grosbeaks.

Remarks. Reports of summer occurrence, all of which I consider questionable, are: a flock, about June 12, 1916, at East Sumner, Oxford County (Mrs. A. Park); two on July 14, 1940, at Blue Hill, Hancock County (Anon., 1940); and one in late July, 1944, and three on July 20 and for about a week thereafter, in 1946, at Boothbay, Lincoln County (B. Howe, 1948).

There is mention of a flock of 30 at Lewiston on "Armistice Day" (D. Norton *in* Gross, 1948b: 71), but the year was not stated. Apparently it was in 1947.

Cedar Waxwing

Bombycilla cedrorum Vieillot

Summer resident, common throughout, including islands; *transient* common in spring and fall; *winter resident,* appearing from December, or more often in February, into April.

Spring. There are a few early May records which are for wintering flocks. Thereafter, the species is rare until about May 23 to 30 when the summer residents generally arrive. In some years at Presque Isle, Chamberlain has not noted the species until the end of the first week in June.

Fall. The summer residents generally depart from late August to the end of September. There are a few occurrences for throughout October, and small flocks have been reported for the first 11 days of November in three different years.

Breeding. The following account is condensed from that of Knight (1908b: 466–467), with additions. The nest is on the limb of a tree, usually five to 40 feet from the ground, and in a wide variety of sites. These include orchards, hedges, elms and maples along city streets, and cedars, spruces, pines, firs, or other evergreens in pastures or on hills. The species also nests along streams and rivers. In northern forests it nests in trees in open bogs. Apparently almost any tree site, except one within a dense stand of forest trees, may be selected. Nests are substantial structures of dry grass only, or of cedar bark,

hemlock roots, twigs of various kinds, paper, rags, and twine, and are lined with hair, wool, and feathers. Nests in bogs have a foundation of twigs, the rest being *Usnea* and other lichens. Norton once found one built on an old Robin's nest. Nest building requires seven to 12 days, and an egg is laid each day until the clutch of three to six (generally four or five) is completed. Earliest egg date is June 19, for a set of four fresh in 1887 at Westbrook, Cumberland County (Norton), and for four slightly incubated in 1941 at Orono, Penobscot County (Eckstorm).

In Michigan, Lea (1942) found that incubation required an average of 11.7 days, fledging 15.5 days, and the female did all the incubating and brooding. Young, nearly ready to fly, were still in a nest on September 11, 1917, at Westbrook (Norton). Perhaps second broods are raised quite often in Maine.

Winter. There are almost no records for early December. From late in the month, or more often February, to well into April, flocks have been seen at various points throughout the state. These usually contain less than 30 birds, rarely as many as 100. They wander a great deal, often leaving an area after only a few days. The species seems to be generally absent throughout the state for a period before the arrival of summering birds in late May.

Ecology. The summer residents remain in flocks until well into June, there being much display and social ceremony among the birds. The wide variety of breeding habitat is discussed above. After the young are fledged, the birds gather in flocks again and are gregarious until the following breeding season. Knight (1908b: 465–466) has given a detailed and valuable account of the food eaten by these birds; to this should be added a number of reports of this bird eating juniper berries, blueberries, and service berries. Very little seems to be known of the habits of the winter flocks, whose presence or absence probably is governed, or at least partially, by the supply of available food.

When the Bohemian Waxwing is present, it is an associate of the present species in winter. In migration, flying or perching flocks often are joined by Bluebirds, Cowbirds, Starlings, and other birds, for brief periods.

Family LANIIDAE

Great Gray Shrike; Northern Shrike

Lanius excubitor borealis Vieillot

In *incursion* years, a fairly common *transient* and *winter resident*, and in other winters, varying from nearly absent to uncommon.

Migrations. This shrike usually arrives from October 23 to November 16, perhaps most often in the last week of October. Early dates are for October 13, 1884, at Westbrook, Cumberland County (Norton), October 13, 1886, in the Umbagog region [? Me. or N. H. part] (Brewster *in* Griscom, 1938: 556), and October 18, 1897, at Seguin (Spinney).

Departure occurs throughout March and to April 11, the one later record of unquestionable authenticity being for a bird shot by Norton on April 19, 1890, near Portland.

Incursions. In summing up all Maine data available to me, it appears that incursions have occurred in the following winters: *1889–90, 1893–94, 1909–10, 1917–18, 1921–22, 1926–27, 1930–31, 1934–35, 1939–40, 1944–45.* These findings were then checked against the list of winters of maximum numbers in the northeast given by Davis (1937: 45), which had not been consulted previously. His data cover the years 1900 to 1935. The only winters for which Norton's data were too fragmentary to indicate incursions, as listed by Davis, were those of *1900–01, 1905–06,* and *1913–14.* Undoubtedly there were high numbers in Maine in these winters also.

In writing of the interval between maximum numbers of this species, Davis (ibid.) pointed out that a change in the length of the period has taken place, having been before 1893 usually three years (average 3.3), but now averaging 4.2 years. Like the incursions of the Snowy Owl and Goshawk, those of this shrike correlate with periods of scarcity of mice and lemmings in the North.

Winter. In incursion years, the population increases until late December, and, sometimes, apparently even into January. Occurring chiefly on the coast, the number of birds seems to remain fairly constant thereafter until the time of departure. I find no certain evidence that the species is entirely absent at this season in other than incursion years.

Ecology. These solitary birds perch in any place commanding a good view of the surroundings in open or fairly open country, such as farmlands, swamps, and bogs—in brief, where meadow mice, insects, or small birds are readily available. It is interesting to note that a shrike, shot on December 15, 1887, on Matinicus Island, had eaten, besides insects, a "substance resembling purple berries," as reported by Cahoon (1888: 103).

Remarks. Reports of occurrence earlier in the fall or later in the spring than those I have cited, seem to me to be open to question. They probably refer to the Migrant Shrike, as do all the published references to breeding of the Northern Shrike in Maine.

Migrant Loggerhead Shrike

Lanius ludovicianus migrans Palmer

Summer resident, regularly uncommon and local (absent from islands and from most of eastern Maine); *transient*, uncommon in spring and fall; one *winter* record.

Spring. This shrike generally arrives from April 2 to 7, occasionally as early as March 29, or as late as April 17. Knight (1908b: 470) stated that he had seen one in Penobscot County as early as March 1, 1908, and Swain (*in* Sweet, 1906b: 38) reported its occurrence on March 24, 1905, at Farmington, Franklin County.

Fall. Migration apparently begins before mid-August, for records of occurrence show a rapid decrease from August 17 on. There are very few reports for October and these later ones: one seen on November 12, 1917, at Gorham, Cumberland County (Norton); and one [shot] on November 17, 1900, at Westbrook, Cumberland County (Norton, 1901b: 27).

Breeding. The data here given are summarized from Knight (1908b: 470–472), with many additions. The nest is placed on a horizontal limb in a tree, apple trees being chosen quite often. It is bulky, composed of rootlets, twigs, twine, rags, feathers, grass, and lined with feathers and wool. The male aids in nest building, incubation, and feeding of the young. Four to eight (usually five or six) eggs make a clutch, the first set being laid in late April or early May. Incubation begins before the clutch is completed and requires 13 to 16 days.

Six sets of six eggs each (five sets fresh and one slightly incubated), in the U. S. National Museum, were collected by C. H. Morrell at Pittsfield, Somerset County, on dates ranging from April 25 to May 17. A nest was found nearly completed on April 28, 1900, and, after the male was shot, the female remated and had five eggs in the nest on unstated later date, at Farmington (Swain, 1901c). A nest with four eggs was found in an orchard the last week in April, 1940, at Corinth, Penobscot County, and, because of repeated robbings, the pair completed a total of five nests that year, the female laying four eggs in each, before giving up and abandoning the site (H. Briggs).

Other egg and young records are: a set of six eggs on May 8, 1896, near Bangor (Knight, 1908b: 471); five fresh eggs on May 11, 1912, at Holden, Penobscot County (Eckstorm); five half-grown young on May 21, 1905, in a nest at Westbrook (Norton); four eggs on May 25, 1878, at Abbot, Piscataquis County (Deane, 1880a); a nest with four eggs collected on unstated day in May, 1893, the pair rebuilding and female laying a second set of four, at Saco, York County (Goodale,

1893); [five] young out of the nest on June 10, 1899, at Portland (Norton, 1899); and on June 8, 1903, one young was near the nest and still being fed, and there was a second clutch of four eggs in the nest on the 10th, in the Umbagog region [? Me. or N. H. part] (Brewster *in* Griscom, 1938: 556–561). Young remain in the nest 18 to 22 days, and, sometime in June, a second brood is started. According to Knight, the male takes care of the first brood while the female incubates the second clutch.

Winter. A bird of this species, presumably the same one on all dates, was seen on December 29 and 30, 1916, and on January 22, 1917, at the same locality in Portland, by Norton.

Ecology. These shrikes generally occur where there are scattered trees on dry hillsides or in cultivated fields, and seemingly much less often in trees near wet areas. They return to the same area year after year to breed, and about Bangor have been found in the same places since the early 1880's. Like its larger relative, this shrike perches in conspicuous places and pounces on its prey, which includes insects, small birds, and mice. Noble (1902) reported capturing one of these birds alive as it struggled with a snake, and Brewster (*in* Griscom, 1938: 558) reported one catching a Pickerel Frog. Small family groups wander about in July and early August prior to migration.

Remarks. Mousley (1918: 33) wrote that this shrike "has increased in numbers ever since the clearing of the country, having invaded the eastern side of the continent principally, I suppose, from the Mississippi Valley. As to the exact date of its first breeding [in Quebec], I cannot say, but some idea may be formed when we consider that it was first recorded doing so in Maine in 1877, and in Vermont the same year."

Numbers have decreased in Maine in recent decades, but pairs still may be found in summer regularly at quite a number of localities. All published records of shrikes nesting in Maine refer to the present species.

Swain (1900a) reported seeing a "Loggerhead Shrike" on December 25, 1899, near Westbrook, but later (1900d) corrected it to Northern Shrike.

Family STURNIDAE

Common Starling

Sturnus vulgaris vulgaris Linnaeus

Introduced. Summer resident, numerous to abundant in and about centers of human population, with numbers decreasing to common in some rural areas and uncommon but regular in many places remote

from occupied human habitations, such as forest clearings and on some islands; *transient,* in unknown numbers in spring and fall; *winter resident,* numerous to abundant in all sizeable centers of human population, and in lesser numbers in smaller centers, including some islands (e. g. Monhegan some winters). Probably many birds are resident and only locally migrant.

Spring. Migration begins at least as early as the first week in March and continues into late April or perhaps even later. There is also, in this period, a dispersal of winter residents from centers of human population into rural areas and elsewhere.

Fall. There is much wandering of flocks in July and August, which undoubtedly holds for both those that migrate and those that remain all winter. Migration apparently extends from the first week in September to the second week in November. Beginning in August, many flocks make flights into cities and towns to roost at night. By the time lasting snows have arrived, these flights largely cease and most birds remain in or about cities and towns all winter.

Breeding. The data here given are mainly for the Portland region and summarized from Norton's notes, unless otherwise stated. The nest is an untidy structure, largely of straw, in a hole in a tree, crevice in a building, or in a nest box. As early as the last week in February, the birds show an active interest in nesting sites by inspecting them frequently. On February 13, 1932, a warm sunny day, attempted copulation was observed, after which both birds went into a nest box and were there together for a few minutes.

Bills of adults usually change from dark to yellow in late March and the first half of April, and even in February in some individuals. At this time also, the species becomes more vociferous. By April 15 many birds are seen carrying nesting material, sometimes placing it in nesting sites and sometimes bringing it out. Some birds, believed to have been males, have been observed occasionally carrying small flowers about, often leaving them in nests, or carrying them in, then out, and dropping them close by. A pair was observed to engage in the nest building phase of activity intermittently for over two weeks. Copulation has been observed from April 15 on. As early as April 20, 1924, a bird was seen carrying insects into a nest, but there is the possibility that these were for the mate rather than for an early brood of young.

Most eggs are laid in late April and the first half of May, and young have been found in nests from May 16 on. Four to seven (usually five) eggs make a clutch. Eckstorm secured five, slightly incubated, on May 13, 1933, at Holden, Penobscot County, and two similar sets there on the 30th. Outside of Maine, the incubation period has been

reported as 11 to 14 days by various authors. This begins when the clutch is complete, and the male does some incubating. Fledging requires about three weeks or a little less. The young are fed by both parents, but mostly by the female. In southwestern Maine, many young leave the nest during the first ten days in June, being fed by at least one parent for an unknown period after attaining flight. It is doubtful that more than one brood is raised yearly. Flocking begins by mid-June and, by the third week in July, the bills of adults have again darkened to winter color.

Ecology. In the breeding season, this bird is found in a very wide range of localities, from cities to remote rural areas, clearings in extensive forests, and even on uninhabited islands. In late summer and migration, the flocks, sometimes containing over 2,000 birds, avoid forested areas, and are found in fields, sheep pastures on islands, or even feeding on mud flats when the tide is low. In winter they feed at garbage dumps, about stables, on mud flats, and on food put out for birds. The wintering flocks roost in trees and in or on buildings, particularly in open church steeples, and a few roost in tree cavities which are used at another time for nesting.

This is a very social species, the breeding adults tending to be somewhat gregarious even when away from the nest and hunting food. The Cowbird is a regular associate in late summer and in migration.

Remarks. A brief account of the spread of this bird in the state follows. Boardman (1889) reported a Starling, which was with some Red-wings, taken at Calais, and wondered if it was one of those liberated in Central Park, New York City, in the spring of 1889. He did not give the date of capture, May 4, 1889, till later (*in* Knight, 1897d: 85). On November 14, 1946, W. A. Squires, of the New Brunswick Museum, wrote me that this specimen is still in existence, that the date and locality are as given above, and that the bird was collected by a Mr. Rideout.

An unstated number of birds was seen in January, 1913, at Rumford, Oxford County (P. Jenness). A flock of 25 to 30 was seen on August 16, 1914, on Monhegan (Fuller, 1914). The species nested at Fryeburg, Oxford County, in 1916 (P. Jenness). Five were seen at Stroudwater, a suburb of Portland, on December 27, 1916, and the presence of immature birds in the following summer indicated that probably four pairs bred in 1917 (Norton, 1918c). One was seen the last of March, and three on April 24, 1917, in Lewiston, Androscoggin County (C. E. Miller, 1918: 51). The species probably nested in Windham and Gorham, both in Cumberland County, in 1918 (Norton).

The first bird seen at Brunswick, Cumberland County, was noted on November 20, 1920 (Walch, 1926: 58), and the species first wintered

at Lewiston in 1920–21 (C. E. Miller). In 1921, they were first seen at Waterville, Kennebec County, about mid-March, several pairs nesting there later in the year (E. H. Perkins; A. S. Pope), at least 200 birds were present in Portland and its suburbs in summer (Norton), one was seen on August 26 at Rockland, Knox County (Lermond, 1921), and a flock of 32 was seen on November 29 at Saco, York County (Mrs. F. Abbott). In 1922, the species first nested at Berwick, York County (A. Perkins), and at Burnham Junction, Waldo County, and Bangor (P. Jenness). In 1923, five were seen on January 19 at Bath, Sagadahoc County (Spinney), and two on March 25 at Jonesport, Washington County, where none was seen again for at least a year, but they nested in 1928 (E. B. Sawyer). Although Mousley (1924: 158) stated that the species had occurred in Aroostook County, he gave no details, and Chamberlain wrote me that a bird caught by a cat, in 1927, at Presque Isle, is the earliest record for the county. By 1924, flocks of 50 to 200 birds were seen regularly in western Cumberland County, and apparently most, if not all, of these birds remained through the winter, moving from rural areas into cities and villages for the season.

There is little need for further detailed records. By 1930, the species was nesting at localities throughout the length and breadth of the state. It has continued to increase in numbers on the mainland and on islands, spreading from village to village, usually in winter, and to rural and wild areas in spring. In June, 1945, I saw two pairs in fairly remote woods on the Upper Magalloway River in Oxford County. Here they gleaned their food on the river banks and in the few clearings and nested in an abandoned lumber camp. At the present time, the Starling may be encountered almost anywhere in the state in summer, but its population would seem to be near the optimum limit.

In connection with the wanderings of this species, it is perhaps of interest that, about March 13, 1933, one flew aboard the trawler *Spray*, about 190 miles east of Boston (*Gloucester Times*, March 15, 1933).

The competition of this species with other hole-nesting birds should prove worthy of study. It molests the Flicker a great deal, but does not always succeed in driving those birds away from their nests.

Family VIREONIDAE

Northern White-eyed Vireo

Vireo griseus noveboracensis (Gmelin)

Four sight records, by competent observers, as follows: one on June 17, 1941, at Medomak, and one on July 27, 1940, at Muscongus, both

hamlets in Bremen, Lincoln County (Cruickshank); one on September 11 and 13, 1937, near Lovewell's Pond, Fryeburg, Oxford County (C. K. Nichols); and two on September 13, 1945, at Cape Rosier, Hancock County (M. and R. Emery).

Remarks. This species was listed as a visitant in Maine by at least five early authors, but there seems to be no satisfactory basis for this. They were, perhaps, based on a very broad statement by Audubon, who wrote that he had seen this species in every part of the United States visited by him, and in Nova Scotia and Labrador. Smith's report (1882–83: 465) of a pair of these birds nesting at Portland seems a little too indefinite to accept.

Yellow-throated Vireo

Vireo flavifrons Vieillot

Occasional *summer resident* in southwestern Maine (limits unknown) and rare summer *visitant* throughout most of the state.

Spring. This species arrives in southwestern counties from about May 14 to 22. Earlier dates are: May 4, 1934, and May 11 in 1935 and 1939, at Hallowell, Kennebec County (Mrs. A. Grover); May 12, 1902, at Westbrook, Cumberland County (Norton, 1905a: 46); and May 13, 1910, at Farmington, Franklin County (Swain *in* Sweet, 1911a: 53). The duration of migration is unknown.

Fall. This species apparently departs in September, there being these dates for the month: September 5, 1905, at Avon (Sweet, 1906b: 38); September 9, 1903, at Westbrook (Norton, 1905a: 46); one seen on September 10, 1945, two the next day, and three on the 12th, at Cape Rosier, Hancock County (R. and P. Allison); September 11, 1875, at the foot of Ripogenus Lake, in Township 3, Range 11, Piscataquis County (Deane, 1876); September 12, 1908, near Portland (Eastman *in* Brownson, 1909: 84); and one seen on September 22, 1937, at Scarborough (Norton).

Breeding. There are no Maine data, except that pairs have been seen several times in summer in Cumberland County, where, according to Mead (1910c), a Mrs. J. F. Wardwell, of Bridgton, reported a pair nesting in a tree on her lawn and young nearly ready to leave the nest on June 25, 1910. Outside of Maine, the species is reported (*in* Forbush, 1929: 189) as nesting in deciduous trees, generally quite low, but sometimes up to 50 feet, laying three or four eggs in a semi-pendant nest, and incubating for perhaps 12 to 14 days. The fledging period seems not to be recorded. The species is single-brooded.

Ecology. Most birds, except for a few migrants, have been seen in mature, rather open-crowned, deciduous trees, such as oaks and maples.

Remarks. Knight (1908b: 479) listed occurrences in ten counties. Of the remaining six, there are records for all except Knox and Somerset, the records being: one seen in May, 1907, at Fort Fairfield, Aroostook County (F. M. Kilburn); one seen on August 8, 1944, at New Harbor (S. McClary), and one on July 12, 1946, at Jefferson (S. Higginbotham), both in Lincoln County; one on June 13, 1906, at Bethel, Oxford County (Brewster *in* Griscom, 1938: 565); and on June 3, 1906, at Saco, York County (Abbott *in* Brownson, 1907c: 39).

Blue-headed Solitary Vireo

Vireo solitarius solitarius (Wilson)

Summer resident, common in coniferous and mixed woodlands, except in southwestern counties (including some larger coastal islands) where uncommon and local but regular; *transient,* common throughout in spring and fall.

Spring. This species arrives in Cumberland County from April 19 to May 3, generally about April 28. A very early date is for one seen and heard by Mrs. F. Goodwin on April 3, 1942, at Portland. One was shot on April 26, 1913, at Brewer (Eckstorm); the species has occurred as early as April 29, 1905, at Avon, Franklin County (Sweet, 1906b: 38); and Chamberlain has noted it at Presque Isle on April 29. His first records for other years range from May 4 to 12. Migration is about over by May 18 in Cumberland County.

Fall. Migration apparently begins in early September, but most birds are noted from September 20 to October 13 and, by the latter date, have usually departed from inland counties. The bird has occurred on or near the western half of the coast until the end of October, and N. C. Brown (1882f: 10) wrote that, in the Portland region, stragglers "linger until the middle of November, if the weather be mild."

Breeding. The nest, usually in a conifer and not over 15 feet from the ground, is a cup-like structure fastened in the fork of a small limb in a shaded place. It is carefully woven of many materials and usually lined with the needles of some conifer, and sometimes strips of bark, lichens, or other similar materials are added to the outside. Three or four eggs make a clutch. On May 29, 1933, a set of four eggs, about a third incubated, was taken at Holden, Penobscot County (Eckstorm). One set of four was taken from a nest in a maple, at Saco, York

County, on June 10, 1893 (Goodale, 1893). Carpenter (1886b: 145–146) collected a set of four on unstated date at Jerusalem Township, Franklin County. Tyson and Bond (1941: 68) mentioned a "nest and young, June 20," on Mt. Desert Island. A brood of fledged young was being fed by parents on June 30, 1936, at Gilead, Oxford County (G. Swanson).

Probably both sexes take part in incubation, which, outside of Maine, has been reported (Burns, 1915: 286) as 10 to 11 days. The fledging period apparently is unrecorded. One brood is raised yearly.

Ecology. This is a bird of conifers or mixed forests, usually where the growth is not fully mature, hence somewhat open. The species is rather social in migration, mingling with other vireos and small birds, and often singing while traveling in fall as well as in spring.

Remarks. Audubon (1839: 432) seems to have been the only writer who ever stated that this bird was abundant in Maine. Boardman's (1903: 302) statement that this species remained all winter probably was intended for the Northern Shrike, the next bird following in his list.

Red-eyed Vireo

Vireo olivaceus (Linnaeus)

Summer resident, common throughout, including many inshore islands; *transient,* rather numerous in spring and fall throughout.

Spring. This species generally arrives in Cumberland County about May 11, but occasionally as early as May 3. Very early dates are April 27, 1896, at North Bridgton, Cumberland County (Mead *in* Knight, 1896e), and May 1, 1905, at Livermore, Androscoggin County (Briggs *in* Sweet, 1906b: 38). According to Chamberlain's records, this bird arrives at Presque Isle from May 20 to 28. Migration lasts well into June in Cumberland County. A transient was seen by Pettingill (1939a: 361) as late as June 17, 1934, on Machias Seal Island (Canadian territory).

Fall. Most birds are seen from the last week in August to September 20, rapidly decreasing numbers being noted thereafter until October 10, for which date there are three records. A late date for far inland is October 7, 1937, at Jackman, Somerset County (A. R. Phillips). Latest records at hand are for October 11, 1898, in the Portland region (Brownson, 1908c: 120), and October 14 of unstated year at Brunswick, Cumberland County (Walch, 1926: 64).

Breeding. "The nest is pensile, built in and below the fork of a limb at heights of four to fifty feet from the ground. The forks of elms, maples, birch, apple and many other hard wood trees and shrubs are utilized and less often nests are built in hemlock and pine forks, but

deciduous trees seem to be preferred" (Knight, 1908b: 474). Describing a nest found near Ellsworth, Hancock County, Miss Stanwood 1910e: 46) wrote: "At a very short distance it might easily have been mistaken for a wasp's nest. The foundation of the dainty structure was woven of strips of birch bark, wasp-paper, and fine bark fibre. It was lined with the same bark fibre, pine needles, and a few hemlock twigs, and the whole felted or pasted together in a most wonderful manner." Samuels (1865: 416) wrote of a nest from Maine that was constructed "almost entirely" of bark of the white birch.

Usually three or four eggs make a clutch. Dates are: four eggs on June 8, 1887, near Portland (Norton); nest and eggs on June 10 of unstated year on Mt. Desert Island (Tyson and Bond, 1941: 68); three eggs on June 20, 1886, at Westbrook, Cumberland County (Norton); three slightly incubated on June 23, 1913, at Brewer (Eckstorm); four, incubation begun, on June 22, 1888, and a similar set on the 23rd, near Portland (Norton); and three on June 29, 1894 (Knight, 1908b: 475), presumably near Bangor.

According to Knight (ibid. 474, 475), incubation, by both sexes, requires 12 to 14 days. Fledging probably requires about 14 days. Miss Stanwood (1910e) reported one young in a nest on July 20, and flying the next day, near Ellsworth. An adult was seen feeding a juvenal-plumaged bird on September 10, 1894, in the Umbagog region (Brewster *in* Griscom, 1938: 561). A pair was seen feeding one or more young, out of the nest but two or three days, on August 23, 1946, and presumably the same adults feeding the same young on September 13, at Jackman (A. R. Phillips). It is very doubtful that more than one brood ever is raised yearly in Maine.

Ecology. This bird is found in well-lighted situations. Its main summer habitat is mature deciduous woodlands, but it also is found in low thickets and second growth, especially along streams and about the edges of ponds, and in orchards, and, not rarely, in conifers in mixed woodlands. On June 12, 1896, Brewster (*in* Griscom, ibid.) noted that this vireo was one of the most abundant birds in the Umbagog region, being "of universal distribution but most numerous perhaps in second-growth birches and poplar woods on burnt lands or about clearings." At Caribou, Aroostook County, G. M. Allen (1901: 12) reported that, early in August, some were seen "with flocks of chickadees and warblers in the spruce and balsam woods." The number of species with which it associates in migration is too large to enumerate here.

Remarks. I find no evidence of increase or decrease in numbers of this vireo in years past. Removal of coniferous forests, however, undoubtedly has provided added areas of suitable habitat.

Philadelphia Vireo

Vireo philadelphicus (Cassin)

Summer resident, probably rare to uncommon and local in northern counties, with southern limits unknown; *transient*, regularly uncommon (? often overlooked) throughout in spring and fall; one *winter* record.

Spring. The few data at hand indicate that birds begin to arrive about the second and third week in May. Brewster (*in* Griscom, 1938: 562) reported seeing this species in the Umbagog region [? Me. or N. H. part] from May 13 to 24, 1896, and May 19 and 20, 1881, a half dozen on the last date. Other records are: May 21, 1863, a bird captured at Waterville, Kennebec County (Hamlin, 1865: 171; Deane, 1876); a pair seen on May 21, 1906, and for about a week thereafter at Phillips, Franklin County (Sweet, 1906c: 105); May 22, 1908, at Avon, Franklin County (Sweet *in* Brownson, 1909: 84); and May 23, 1909, at Avon (Sweet, 1909). There are a few records for later May dates. Probably migration lasts into early June. Boardman took a female on June 2, 1872, at Calais (Deane, 1876).

Fall. From available data, it appears that migration occurs mostly in the first 20 days of September. Later dates are September 21, 1899, two birds collected at Bar Harbor, Mt. Desert Island (Tyson and Bond, 1941: 68), September 22, 1904, at Avon (Sweet, 1905c: 63), October 2, 1905, at Avon (Sweet *in* Brownson, 1906c: 64), and November 17, 1900, a bird shot at Westbrook, Cumberland County (Norton).

Breeding. Brewster (1903: 375), describing a nest found in the Umbagog region at Lakeside, New Hampshire, wrote that it was 30 feet from the ground in an aspen (*Populus tremuloides*), and was "hung, after the usual Vireo fashion, in a fork between two diverging, horizontal twigs. . . It appears to be chiefly composed of interwoven or tightly compacted shreds of grayish or light brown bark, apparently from various species of deciduous trees and shrubs as well as, perhaps, from dried weed stalks. The exterior is beautifully decorated with strips of the thin outer bark of the paper birch, intermingled with a few cottony seed tufts of some native willow still bearing the dehiscent capsules. Most of these materials are firmly held in place by a gossamer-like overwrapping of gray-green shreds of *Usnea*, but here and there a tuft of willow down or a piece of curled or twisted snow-white bark was left free to flutter in every passing breeze." An excellent photograph of the nest accompanies the article.

On May 26, 1937, a bird of this species was seen gathering nesting material at Jackman, Somerset County (A. R. Phillips). The Lakeside

nest was found on June 14, 1903, and contained three fresh eggs. The male bird was singing while sitting on the nest; the female was shot, and on dissection found to have laid the last egg of the clutch. In the Province of Quebec, H. F. Lewis (1921) found that the nest was built in a short time, that incubation, by both sexes, required from 13 and a fraction to 14 days, fledging required 13 days, and both parents cared for the young. Probably one brood only is raised yearly.

Winter. On December 29 and 30, 1916, Norton saw a bird of this species in Portland; he saw it again on January 22, 1917, and, although he kept a careful watch, did not see it again; it was singing on the last date seen.

Ecology. Brewster (1903: 370) wrote that this vireo's favorite haunts in the Umbagog region were "second-growth woods about the edges of farms or other openings and burnt lands sparsely covered with young poplars and paper birches." In some localities they seem to prefer alder thickets.

Remarks. In 1900 this species was believed, by Gardner (1901), to have nested at Bucksport, Hancock County. For the Lewiston-Auburn area in Androscoggin County, C. E. Miller (1918: 36) wrote: "One of our best authorities on birds has discovered it nesting here and has also heard its song." Brewster's various published papers show that the species nested in various places in Oxford County. Knight (1906a) saw one bird in the period July 2 to 7, 1906, at Rowe Pond in Pleasant Ridge Plantation, Somerset County. This may have been the basis for his later statement (1908b: 475) that it was "evidently breeding" there. He also (ibid.) wrote: "Aroostook; a pair at Fort Kent in summer, evidently breeding." Others have seen single birds or pairs at various localities, but have not supplied any information on breeding.

The song and general habits of this species are very similar to those of the Red-eyed Vireo, which undoubtedly has hindered us in getting better acquainted with the former. In his journal for June 17, 1880, Brewster (*in* Griscom, 1938: 563) wrote: "I again heard the whining note and carefully criticized the song which I can now tell with absolute certainty from that of *Vireo olivaceus*; it is slower, with less volume, and has a peculiar double syllabled note which is always repeated twice."

Eastern Warbling Vireo

Vireo gilvus gilvus (Vieillot)

Summer resident, rather common in a few localities in western but decreasing to decidedly uncommon in eastern and northern count-

ies, and probably absent from most islands; *transient*, rather common in southwestern Maine, but uncommon elsewhere in spring and fall.

Spring. This species arrives in western counties from May 8 to 18, usually about the 11th. It has been seen as early as May 5, 1902, at Waterville, Kennebec County, by Swain (*in* Sweet, 1904c: 79). (See Remarks for earlier reports which seem doubtful.)

Fall. Migration occurs in the last two weeks of August and to September 17, there being records for several localities on this latter date. Reportedly, it was seen on October 5, 1903, at Skowhegan, Somerset County, by Swain (*in* Brownson, 1906f: 96); G. M. Allen's (1909: 179) "Oct. 7" date may be a misprint for this.

Breeding. There are no detailed reports for Maine. During the period 1933 to 1937, I saw deserted nests in winter and one occupied in June. This latter was in a tree on a lawn. The nests were located at about 40 feet in maple trees at Orono, Penobscot County. Knight's (1908b: 478) report of a nest in his collection was given without data, and probably was obtained outside the state on exchange. This vireo nests in a deciduous tree, well above the ground, and usually near the end of a slender branch. The nest is a basket of the usual vireo type, suspended from a forked branch. Outside of Maine, this bird is reported to lay three to five eggs, and both sexes incubate for about 12 days. The fledging period apparently is unrecorded. One brood is raised yearly.

Ecology. Although occurring throughout most of the state, this bird is found only in a few favored localities, where the presence of several pairs would lead one to believe that it is somewhat colonial in habits. I have found it most often in the tops of mature maples and elms in urban and rural areas and along river banks. "Perhaps a dozen pairs breed every year in the fine elms that line the streets of the city [Portland]" (N. C. Brown, 1882f: 10).

Remarks. The following reports are for such early spring dates that they seem questionable: two on April 2, 1882, in the Portland region (Smith, 1882c: 208); April 9, 1910, at Farmington, Franklin County (Swain *in* Sweet, 1911a: 53); and April 24, 1914, at Brunswick, Cumberland County (Walch, 1926: 64).

Family PARULIDAE

Black-and-white Warbler

Mniotilta varia (Linnaeus)

Summer resident, fairly common in all counties; *transient*, numerous in spring and fall.

Spring. "Though according to Mr. Brown [1882f: 6] occasionally arriving as early as April thirtieth, the species more often arrives in southern Maine about May third and in central and northern Maine four to ten days later" (Knight, 1908b: 488). The earliest recorded occurrence (*in* W. Cooke, 1905: 203) is April 27, 1897, in southern Maine. There are April 30 occurrences for Cumberland and Oxford Counties, and May 1 records east into Knox County. Chamberlain has noted the species at Presque Isle as early as May 5. In southern counties, migration is at its peak about May 10, and apparently is over by the 28th.

Fall. Most birds are noted from the last week in August to September 21. There are records for several counties to the end of September. This warbler was seen as late as October 9, 1918, on offshore Monhegan, by Wentworth (*in* Jenney, 1919: 29), and N. C. Brown (1882f: 6) stated that it remained in the Portland region "in mild seasons until the middle of October."

Breeding. Knight (1908b: 488–489) wrote: "The nest is always placed on the ground, on a mossy hummock, by the side of a stump or log, under a bush or beneath the upturned roots of a tree or in a very similar situation to those described. A typical set in my collection was taken, May 27, 1896 [probably in Penobscot County], from a nest placed on the ground near a mossy log, and was composed of leaves, strips of fine fibrous bark and grasses, lined with grasses and fibrous roots of a black color. . . Nest building in Maine commences as early as May fifteenth, sometimes even earlier, and full sets of four or five eggs are found by May twenty-fifth to the thirtieth and occasionally belated layings as late as the middle of June. Unless found while the female is building, the nest can usually be located only by flushing the incubating female from directly under your feet. I am not prepared to state what aid the male gives in building or in the task of incubation, but he is generally in the vicinity to respond and add his voice to the tumult when the female is disturbed, and he also helps feed the young."

Outside of Maine, incubation has been reported (*in* Forbush, 1929: 199) as by the female, and requiring 13 days. The fledging period apparently is unrecorded. Probably one brood only is raised yearly.

Ecology. "In the breeding season the species is a bird of the woodlands, seemingly most often found in rather open hardwood growth, sometimes in the upland type of woods, more frequently perhaps in the lower, richer, damper tracts of hard or mixed growth. In the northern spruce woods of the State the species is very rare, and though found locally even in quite goodly numbers it is missing from extensive

tracts of land where coniferous growth predominates. In southern Maine the species seems to occur more generally though still local during the nesting season" (Knight, 1908b: 488). Brewster's data (*in* Griscom, 1938: 565) for Umbagog clearly indicates that this is not a bird of the original soft-wood forests, for the species "was not safely presumed to be nesting until 1903," by which date hardwoods were predominant in much of the region. Years later, Perry (ibid. 618) found this bird common in that area, and in 1945 I found it common north of the region on the Upper Magalloway drainage.

Remarks. Although the evidence is rather meager, this bird apparently has decreased slightly in Maine during the past ten years.

Prothonotary Warbler

Protonotaria citrea (Boddaert)

One specimen, an adult male, was collected in August, 1868, on offshore Matinicus Island, and subsequently was added to the collection of the Museum of Comparative Zoölogy at Harvard (Brewster, 1909).

Remarks. A. E. Verrill (1863: 234) recorded a specimen taken, "on the last day of October" in 1862, by Boardman, "near his house." Numerous authors, citing Verrill, have assumed that this was a Maine occurrence, overlooking the fact that J. A. Allen (1886: 255) pointed out that the locality was St. Stephen in New Brunswick.

Worm-eating Warbler

Helmitheros vermivorus (Gmelin)

One sight record. On September 1, 5, and 12, 1935, one of these birds was seen with other migrant warblers, near Jackman, Somerset County, by Foerster (1936), a competent observer.

Remarks. The following reports are too indefinite to comprise acceptable records. Audubon (1839: 460) reported the species as occurring in Maine. A. E. Verrill (1862b: 156) wrote: "Summer; southern Maine; rare." Smith (1882–83: 445) stated, in part: "Since Audubon recorded this species for Maine, the capture of but a single specimen has been publicly reported. This was recorded by Prof. A. E. Verrill." He then cited Verrill's statement, which is quoted above *in full.* The possibility exists that a specimen was taken and not recorded properly, for a letter from Verrill to Norton, dated November 24, 1921, contained the following: "As for *H. vermivorus,*

I can add nothing definite I fear. I recollect that Dr. Brewer once told me that he had seen a specimen from southern Maine. That was between 1860 and 1864." Knight (1908b: 652) wrote: "Mr. J. Waldo Nash has written me that he saw a pair of these birds with young at Norway [Oxford County] in 1893."

Golden-winged Warbler

Vermivora chrysoptera (Linnaeus)

Two specimens (York and Cumberland Counties), and *sight records* (York, Hancock, and Washington). Probably breeds.

Migrations. The earliest and latest of the few dates are as follows: one, in the possession of J. M. Dudley of Calais, was killed in late May, 1931, on the Mere Point road in Brunswick, Cumberland County; and J. D. Smith (1929) mentioned a bird seen on September 6, 1929, at Emery Mills, in Shapleigh, York County, and May (*in* Forbush, 1929: 209) supplied the added data that it was a male, shot, and in the collection of the Boston Society of Natural History.

Summer. No nests have been reported. Outside of Maine, this species is reported as building a bulky nest, on or near the ground in a brushy place, and usually laying five eggs which are incubated about ten days.

This species was observed on Mt. Desert Island on June 5, 1915, as reported by Tyson and Bond (1941: 67) who also stated that it nests in York County. "I saw a Golden-winged Warbler at Calais in June, 1946" (J. M. Dudley). "On July 3, 1937, between Sanford [York County] and Westbrook [Cumberland County] . . . among second-growth hardwood with some scattered white pine and other evergreens, at least six . . . were observed . . . On July 6, 1937, the writer stopped at Emery Mills, at evening, and again heard the song. Two birds were seen and their songs were heard. All observations were made with a six-power field-glass and the birds were in plain view many times" (Bode, 1940). "I saw parents feeding young at Sanford in early August, 1922" (Dr. Anne Perkins).

Remarks. The basis for Hitchcock's (1862: 67) inclusion of this species in his Maine list is unknown.

Tennessee Warbler

Vermivora peregrina (Wilson)

Summer resident, common in some Aroostook County localities, but generally uncommon in other northern sections, and diminishing to

rather rare southward and probably very rare (if any) in coastal counties west of Penobscot Bay; *transient*, common well inland and uncommon coastwise and on islands in spring and fall.

Spring. This species occurs at Brunswick, Cumberland County, between May 8 and 27 (Walch, 1926: 65). Knight (1908b: 494) stated that this bird arrived about May 10 to 15, apparently referring to the vicinity of Bangor. Chamberlain's earliest date for Presque Isle is May 12. In Franklin County, spring migration "is at its height during the last week in May" (Sweet, 1906a: 30). Brewster's data (*in* Griscom, 1938: 567) for the Umbagog region, during the 1870's and 1880's, show that this bird was a late arrival, numbers being noted between May 20 and June 9. Migration probably is completed by June 12.

Fall. Most birds are seen during the first three weeks of September. An early record, perhaps for a migrant, is for one seen on August 14, 1936, at Greenland Cove, Lincoln County (Cruickshank). The latest record is for October 7, 1918, on offshore Monhegan, as reported by Wentworth (*in* Jenney, 1919: 29).

Breeding. The nest, mostly of grass, is placed on the ground and, according to Knight (1908b: 495), does not differ appreciably "in construction and appearance from those of the Nashville Warbler, being very similarly situated on the ground in a very wet boggy locality among alders on elevated hummocks of moss. Four or five eggs are laid." In New Brunswick, Bowdish and Philipp (1916: 5) found clutches of five to seven eggs, with the former being the usual number.

Five eggs, advanced in incubation, were recorded for June 4, 1895, near Lewiston, Androscoggin County, by Knight (op. cit.), who also wrote: "I have found nests containing young birds near Bangor on June tenth and fifteenth, so it is evident that they nest very promptly after arriving." At Umbagog, Brewster (*in* Griscom, 1938: 567) shot an incubating bird on June 7, 1871, and noted that several birds "taken previously had laid all but one or two of their eggs." On June 20, 1945, a female was seen carrying nesting material, in Township 5, Range 4, Oxford County (Palmer). The incubation and fledging periods apparently are unrecorded. Singing males have been noted at various Maine localities until after August 20, but it is unlikely that two broods are raised in a season.

Ecology. "During the spring migration and the breeding season the Tennessee Warbler should be sought for in bogs of alder, hackmatack, of young, partly dead, scraggly spruces" (Sweet, 1906a: 30). Brewster's Umbagog notes (*in* Griscom, 1938: 567), for late May and June, mention this bird as especially favoring *arbor-vitae* swamps, thickets of

young spruces, alders and *Viburnums* overhanging water, the "favorite haunts" being larch swamps and bogs. Bond (1947b: 24) stated that, in Hancock and Washington Counties, the habitat is shady clearings. Throughout the summer, this warbler is found at considerable elevations on the higher mountains, being seen most often about the edges of glades and clearings among low spruces.

It should be noted that, in New Brunswick, Bowdish and Philipp (1916: 3) considered this bird to be somewhat colonial during the breeding season.

Remarks. Although Brewster found this warbler a common summer resident in the 1870's, he wrote (*in* Griscom, op. cit.) that, in 1896, it was not met with "either at Lake Umbagog or along the roads between Lakeside [N. H.] and Bethel and Lakeside and Colebrook [N. H.]. I fancy that its desertion of the Umbagog valley is due to the fact that practically all the larches were destroyed by some insect and very few young ones are springing up anywhere in this region." Perry (ibid. 618) reported finding the bird at Tyler Bog, in the same region, in 1932 and 1933, but not in 1936. It was fairly common in larches farther northward on the upper Magalloway in 1945 (Palmer).

The increase in records of this species in Maine probably is due to a greater number of trained observers rather than to an actual increase in numbers.

"There are remarkably few records on Mt. Desert Island, but on Schoodic Point, on the mainland just to the east, ten singing males were counted on July 14," 1938 (Dietrich, 1938). This is an exceptional count for an eastern coastal locality in mid-summer.

Eastern Orange-crowned Warbler

Vermivora celata celata (Say)

Three fall records (one for a capture); status unknown, but probably of rare occurrence and mainly in fall.

Records. On September 2, 1898, Brewster (*in* Griscom, 1938: 566) saw one of these warblers at Pine Point, in Magalloway Plantation, Oxford County. On October 13, 1934, one was captured alive at Bangor; it was kept in a cage, studied carefully, and liberated two days later (Mendall, 1935a). On October 12, 1941, W. H. Drury, Jr. saw one of these birds on Mt. Bigelow, in Dead River Plantation, Somerset County (Taber, 1948b: 48).

Remarks. Audubon (1834: 449, 450) stated that this warbler "reaches the State of Maine" and "breeds in the eastern parts," as well as in New Brunswick and Nova Scotia. Knight (1908b: 652–653)

placed the species in his hypothetical list, stating: "Audubon records the species as breeding in eastern Maine, but it seems very likely it is a mistake, and subsequent writers have so regarded his statement. There is said to be a set of eggs in the Smithsonian Institution which were collected near Brunswick [Cumberland County], Maine, and referred to this species, but the data to the set seems to be lacking, and I am more than inclined to believe that the Nashville Warbler is the really responsible species for our Orange-crowned Warbler records."

Of three Umbagog occurrences recorded by Brewster (*in* Griscom, 1938: 566), a female, shot on September 26, 1890, was taken in Cambridge, New Hampshire; it cannot be determined from the journal entry, as published, whether the sight record for August 30, 1895, was for Maine or New Hampshire; and the third record is cited above.

A few Orange-crowns spend the winter as far north as Massachusetts (H. Wright, 1917a).

Eastern Nashville Warbler

Vermivora ruficapilla ruficapilla (Wilson)

Summer resident, rather common throughout the state, including many larger islands; *transient,* numerous in spring and fall.

Spring. In southwestern counties this warbler usually arrives from May 2 to 13. Two exceptionally early dates are for April 22, 1914, at Brunswick, Cumberland County (Walch, 1926: 65), and April 30, 1905, at "Portland" [Cape Elizabeth] (*in* Brownson, 1906d: 68). It has been seen as early as May 1, 1938, at Lewiston, Androscoggin County, by P. Wright, and four on May 4, 1944, at Brewer, by Weston. At Presque Isle, Chamberlain has noted it twice on May 5 and five times on the 9th, as well as on intervening dates in other years. Migration probably ends the last week in May.

Fall. Most birds are noted from September 5 to 28. Latest records are: October 3, 1908 (Eastman *in* Legge, 1909b: 115), and October 4, 1882 (N. C. Brown, 1882f: 6), in the Portland region; October 6, 1937, at Jackman, Somerset County (A. R. Phillips); October 7, 1918, on Monhegan (Wentworth *in* Jenney, 1919: 29); October 9, 1885, at Lake Umbagog (Brewster *in* Griscom, 1938: 565), though uncertain as to whether the Maine or New Hampshire side; and October 11, 1947, at Jefferson, Lincoln County (S. Higginbotham).

Breeding. "The nest of the Nashville is sometimes placed in comparatively low ground (that is, compared with its immediate surroundings), in soft green moss under an apology for a shrub, again in the side of a knoll covered with bird wheat (hair-cap) moss, or at other times in an open space in the woodlands under a stump, or tent-like

mass of grass, or a clump of gray-birch saplings. Around the top is usually woven a rim of coarse, soft, green moss; sometimes dried boulder fern or bracken is added. The side coming against the stump or overhanging moss lacks this foundation. The nest is lined with fine hay, if it abounds in the neighborhood, or pine needles if they are nearer at hand. Sometimes both are used. The red fruit stems of bird wheat moss and rabbit's hair are often employed. One or two birds have preferred some black, hair-like vegetable fibre for lining matter, one bird, horse hair" (Stanwood, 1910c: 29). The female does most of the nest building, but Knight (1908b: 493) reported seeing a male bring one or two pieces of fibrous material to a nesting site. He also reported (ibid. 492) that seven to nine days are required for building, after which an egg is laid daily (usually between six and ten A.M.) until the clutch of three to five (usually four) eggs is completed.

Mendall found a clutch of five eggs and one of four (the latter having five the next day) on June 2, 1937, at Edmunds, Washington County. All other dates, except those cited below, fall within the June 3 to July 4 period given by Knight (ibid. 493). Near Ellsworth, Hancock County, Miss Stanwood (1910c: 28–29) noted these late dates: last (fourth) egg of a clutch laid on July 7, 1909; four eggs found on July 16, 1909, which hatched on the 24th, and the birds left early on August 4; and three eggs which later hatched, found on August 7, 1907. Both sexes incubate and the male brings food to the female on the nest during the latter part of incubation (Knight, 1908b: 493). Knight (ibid.) gave the incubation period as "slightly over eleven days." This is in close accord with the 12 days reported by Stanwood (1910c: 32). The former also stated that the young leave the nest "about the eleventh day after hatching," which agrees with the ten full days for fledging recorded by the latter. Probably one brood yearly is the rule.

Ecology. Nesting habitat near Ellsworth was described by Miss Stanwood (1910c: 29), in part, as follows: "When a growth of evergreens—pine, fir, spruce and hemlock—is cut, it is succeeded by a growth of hard wood—gray, white and yellow birches, maple, poplar, beech, cherry and larch—and vice versa. As the woodland is cut in strips, there are always these growths in juxtaposition. Though the nest of the Nashville is always placed among the gray birches, the inevitable strip of evergreen woodland is near at hand, and a swale not far away."

The species is found less commonly in old fields or abandoned pastures partly overgrown with birches or mixed woods. On June 15, 1936, Norton saw a singing male in a birch thicket at an elevation above the spruces on the North Basin trail on Mt. Katahdin. The

bird occurs at high elevations on other mountains in the state. A considerable portion of its food apparently is picked up from the ground.

Remarks. Confirmation is lacking for Knight's statement (1908b: 492) that incubation begins as soon as the first egg is laid, but it is probably correct, as many species of warblers do begin incubating before the clutch is completed.

Northern Parula Warbler

Parula americana pusilla (Wilson)

Summer resident, numerous in coniferous forests on and near the coast and on islands from Sagadahoc County eastward and fairly common in conifers elsewhere throughout; *transient,* numerous in spring and fall coastwise and very common inland.

Spring. This bird usually arrives from May 5 to 8 in southwestern counties, and is generally present throughout by the 12th. The earliest Portland date is for April 29, 1908 (*in* Brownson, 1909: 84), and there are four records, in different years, for May 3. Other early records include May 1, 1916, for Brunswick, Cumberland County (Walch, 1926: 65), and May 3, 1944, at Hampden, Penobscot County (Mrs. P. Hannemann). Some birds are seen migrating until the end of the month.

Fall. Migration, occurring from about August 27 to October 7, is at its peak from September 9 to 21. A single bird was noted on October 4, 6, 7 to 9, and 20, 1918, on Monhegan (Wentworth *in* Jenney, 1919: 29). Other late dates include October 26, 1914, for Portland (N. C. Brown, 1920), and one seen on October 27, 1945, at Brunswick (J. Veghte).

Breeding. This warbler, somewhat colonial, nests inland as well as along the coast and on islands, including offshore Monhegan. "During the two summers [at Hog Island in Bremen, Lincoln County] we have found some two dozen nests ranging from four to fifty feet from the ground. These nests were invariably made of nothing but usnea with rarely a strand of grass or a couple of spruce needles in the lichen cradle" (Cruickshank, 1938: 551). "The same nesting site is often occupied in successive seasons, eggs being laid in the very same nest or another nest constructed in a situation close at hand. Sometimes two occupied nests have been found in the very same tree, and generally a few pair nest in the same vicinity. While three to seven eggs are sometimes laid, four or five is more usually the clutch" (Knight, 1908b: 498).

Most eggs probably are laid during the first ten days in June. Near Pittsfield, Somerset County, Morrell (1898a: 21) reported finding an unstated number of eggs as early as May 27, 1898 and, in the same tree, young as early as June 10, 1897. "May 31, 1899, C. D. Farrar and myself found a colony of Parulas nesting in the Wales bog at the head of Sabatis Pond [Wales, Androscoggin County]. We found six nests, but only one of them contained eggs. This nest . . . [contained] five well incubated eggs. June 11, 1899, a female was seen near the same place, lining its nest, and June 17 four eggs had been laid" (E. Johnson, 1901: 20). "According to my notes this warbler has an incubation period of 11 or 12 days. The fledglings have to remain in the nest for 9 days (occasionally 8 or 10)" (Cruickshank). The species probably is single-brooded.

Ecology. As a migrant throughout the state in spring, this warbler is seen feeding in the budding tops of deciduous, as well as in coniferous, trees. Later, when nesting, it is largely confined to moist areas inland, such as bogs having larches and spruces, or the fog-drenched spruces of the coast and islands, for it is in these places that the nesting material, *Usnea*, is found. This lichen grows on both deciduous and coniferous trees, and the Parula appears to show no marked preference for either type of tree. A red maple among spruces is perhaps a somewhat favored site. At this season the birds feed mainly in the well-lighted parts of conifers, below the very tops and above where the branches of adjoining trees meet to shade the ground.

On a 30-acre tract, mainly of white and red spruces, on Hog Island, Bremen, Peterson (1942: 27) reported the number of breeding pairs for six years (1936–1941) as 10, 11, 10, 9, 19, and 13. The presence of this sizeable colony is due to the great abundance of *Usnea* growing there. There is little restriction to any particular habitat during the fall migration.

Eastern Yellow Warbler

Dendroica petechia aestiva (Gmelin)

Summer resident, occasional in areas of relatively unbroken forest and fairly common elsewhere, including offshore islands; *transient,* numerous in spring and fall.

Spring. This species usually arrives about May 8 in southwestern counties, and about the 13th in the northern third of the state. Earlier records are: April 30, 1906, at Saco, York County (Abbott *in* Brownson 1907c: 40); May 2, 1910, at Brunswick, Cumberland County (Pope *in* Sweet, 1911a: 53); May 3, 1896, at Gardiner, Kennebec County (Royal *in* E. H. Norton, 1902); May 5, 1887, at Calais (Boardman,

1907: 97); and May 9 of unstated year at Presque Isle (Chamberlain). If May is unseasonably cold and stormy, this species may not arrive until about the 20th. Migration usually ends about May 28. (See Remarks.)

Fall. Migration begins about July 24, reaches a peak during the first ten days of August, and is nearly over by August 27. Later dates include September 4, 6, 7, and 9, 1918, on Monhegan (Dewis, 1919: 40), and September 15, 1914, and September 23, 1913, for Falmouth, Cumberland County (Norton). (See Remarks.)

Breeding. "The nest is a very compactly built and well cupped structure, composed of fine soft grasses and rootlets, soft hempen fibers, cottony down from willow catkins, pieces of thread, twine, cloth, shreds of paper, and similar soft material, lined with willow down and a few feathers. . . Nest building, which both parents assist in, requires a period varying from a week to ten days and fresh eggs may be found from May twenty-ninth to even as late as early July. It seems quite likely that these late sets may result from the birds having been robbed or otherwise disturbed in their first efforts" (Knight, 1908b: 502).

Three to five eggs make a clutch. Nesting records, by Norton unless otherwise stated, are: a completed empty nest on May 26, 1929, at Pownal, Cumberland County; one egg on June 5, and four, much incubated, on June 11, 1887, at Westbrook, Cumberland County; a set of three taken, and one egg in one nest and two in another on June 7, 1888, at Westbrook; three eggs on June 10, 1925, at Cape Elizabeth; five young leaving a nest on June 16, 1932, at Brunswick (Palmer); four eggs, a third incubated, on June 18, 1939, at Princeton, Washington County (Eckstorm); and four on June 22, 1888, at Westbrook.

"In some instances the bird begins to incubate as soon as the first egg is laid, while in other cases incubation has not seemed to be commenced in earnest until a day or two after the last egg was laid. In cases under observation the incubation period has seemed to range from twelve to fifteen days from the time of laying of the first egg to the hatching of the first young in cases where the birds seems to have actually begun incubating as soon as an egg was laid. . . The first pin feathers appear at the end of about six days and in a period varying from eleven to fifteen days they are ready to leave the nest" (Knight, 1908b: 503). In Vermont, W. P. Smith (1943: 61–62) found incubation to require ten days, and the young to be fledged in nine to eleven. One brood is raised yearly.

Ecology. This warbler nests in bushy thickets and garden shrubbery. Willows, alders, and cultivated shrubs are selected most often. On

coastal islands, it nests in clumps of deciduous bushes in hollows where there is some protection from the wind.

Remarks. Some of the sight records for transients may pertain to the Newfoundland race, which is the next bird discussed.

Before the original forest was cut off, this warbler probably was restricted to nesting chiefly in young willows along watercourses and to sprout growth in burned-over areas. At a time when the forest was being removed by man, Carpenter (1886b: 129) pointed out that he found the bird chiefly in the vicinity of human dwellings in Franklin and Somerset Counties. Bond (1947b: 23) stated that, in Hancock and Washington Counties, the preferred habitat is the "vicinity of villages or settlements." In heavily wooded areas, this warbler still is noted most often in man-made clearings. A gradual increase in the summer population has occurred, even during the past 40 years.

"The food . . . consists of small soft larvae of Lepidoptera such as canker worms, tortricids and similar larvae which they also feed their young in considerable amount, in addition to which small beetles and bugs of almost any sort are eagerly eaten. They catch quite a bit of their prey on the wing, and I have seen them thus take quantities of adult currant saw-flies while they also eat large numbers of the larvae of the currant saw-fly" (Knight, 1908b: 503).

Josselyn's mention (1674; 1865b: 79) of "*Ninmurders* little yellow birds" seen at Scarborough, probably referred to this species rather than to the American Goldfinch.

Newfoundland Yellow Warbler

Dendroica petechia amnicola Batchelder

Transient, in unknown numbers, in spring and fall.

Spring. Of two specimens taken by E. Perry on May 30, 1904, at Gardiner, Kennebec County, and now in the American Museum of Natural History, one (no. 380838) is perhaps *aestiva,* although not typical, and the other (no. 380837) is a good example of the race *amnicola.*

Fall. Allan R. Phillips took a specimen on August 14, 1937, and another on the 22nd, at Jackman, Somerset County. These were given to the Boston Society of Natural History.

Remarks. In the U. S. National Museum, there is a male *amnicola* (no. 52378) and a female (no. 52379, recatalogued no. 263596), both in spring plumage, neither bearing a date, which were collected by G. A. Boardman, and listed as from Calais. They were catalogued in October, 1868. It has been pointed out previously that Boardman's labels had the printed word "Calais" on them, but that one cannot

be sure in many cases whether a given bird was taken in Maine or in adjacent New Brunswick.

I am indebted to Allan R. Phillips for the above data on specimens.

Yellow warblers of unstated subspecies have been recorded only once for late April along the coast, and none for October. According to Robert Beaton, they occur at Orono, Penobscot County, as early as the last week in April, and in the fall until mid-October. One wonders if these early and late transients are of the race *amnicola*, with a migration route principally across the central part of the state. I am not aware that breeding birds from northern Maine have been examined critically; they may prove to be intermediate between *aestiva* and *amnicola*.

Magnolia Warbler

Dendroica magnolia (Wilson)

Summer resident, common throughout, including inshore islands; *transient*, numerous in spring and fall.

Spring. This warbler generally arrives in Cumberland County from May 6 to 10, although it was noted at Brunswick on May 3, 1914 (Walch, 1926: 65), and at Portland on May 5, 1894 (Norton). The earliest record for the state is April 10, 1901, at Seguin, as reported by Spinney (1903b: 58). In some years, this bird is very late in arriving, not being noted until May 18 or even later. It has been noted first May 9 to 26 at Presque Isle (Chamberlain). During some years, at least, migration apparently continues into the first week of June.

Fall. Most birds are noted in August, the peak of the flight occurring during the second and third weeks of the month, with a few birds seen to September 19. Latest dates are these sight records: September 26, 1905, at Avon, Franklin County (Sweet *in* Brownson, 1906c: 64); September 27, 1910, at Ellsworth, Hancock County (Stanwood *in* Sweet, 1911b: 65); September 28, 1902, at Avon (Sweet *in* Brownson, 1906f: 97); and October 7 and 8, 1918, on Monhegan (Wentworth *in* Jenney, 1919: 29).

Breeding. Brewster's description (1877: 5–6) of nesting in the Umbagog region is typical of data for various Maine localities, and is as follows: "The nest is usually placed in a small fir or spruce, and rarely at a greater elevation than five or six feet. The average height would probably not exceed four feet, and I have found some barely twelve inches above the ground. It is usually *laid* somewhat loosely among the horizontal twigs, from which it can in most cases be lifted intact. Favorite localities are the edges of wood-paths, or roads

bordered by woods, and clearings grown up to small evergreens. Exceptional situations are the interior of the woods, where, in some cases, the nest is placed in the top of a young hemlock ten or fifteen feet up. In one instance I found a nest on a horizontal spruce limb in the very heart of the forest, and at least *thirty-five feet* above the ground. . . The framework is wrought somewhat loosely of fine twigs, those of the hemlock being apparently preferred. Next comes a layer of coarse grass or dry weed-stalks; while the interior is lined invariably with fine black roots, which closely resemble horse-hairs. In an examination of more than thirty examples I have found not one in which these black roots were not used. . . This uniform coal-black lining shows in strong contrast with the lighter aspect of the outer surface of the nest."

Eggs are laid on successive days (Stanwood, 1910g: 386). Brewster (1877: 6) reported four eggs per clutch, with three in some cases, and in one instance, five. Harris and Eckstorm secured nine clutches, all being of four eggs, and R. F. Miller found nine sets of four and one of three. Knight (1908b: 513) stated that eggs were found occasionally by May 30, although June 10 to 15 was nearer the average; dates for the ten sets found by Miller ranged from June 7 to 13; and Brewster (1877: 6) stated that laying occurred from June 8 to 15. A nest, having only a framework on May 27, 1910, in Hancock County, contained two eggs on June 5 (Stanwood, 1910g: 389); three eggs (plus a Cowbird's) were found on June 2, 1945, at Hampden, Penobscot County (Mrs. P. Hannemann); and three eggs on June 6, 1882, in the Umbagog region (Carpenter, 1886b: 130). Six clutches, ranging from fresh to advanced in incubation, were taken by Harris on June 13 and 14, 1933, at Upton, Oxford County. In the same county, Miller found a set of four that was two-thirds incubated on June 7, 1933, at Rumford, and four newly hatched young on June 13, 1934, at Andover. Four fresh eggs were taken as late as June 30, 1933, at Holden, Penobscot County, by Eckstorm.

Incubation, mainly by the female, requires 12 to 13 days (Stanwood, 1910g). In one instance the young left the nest, possibly somewhat prematurely, in ten days (ibid. 387). There is no certain evidence that two broods are raised in a season.

Ecology. Migrating birds are seen about as often in young hardwoods as in conifers, especially in early fall. In the nesting season, this species is found in the edges of coniferous woodlands, in the smaller trees along stream banks, in small conifers in pastures, old fields, and clearings, and in open, somewhat stunted, spruces at fairly high elevations on our mountains. In southwestern counties, it usually is found in young conifers and mixed growth about the edges of bogs

and marshes. The lower branches of larches, both large and small, generally are utilized for nesting sites wherever this tree is found. Mendall has noted nests in spruces in the vicinity of larches. Although this warbler usually feeds among branches, it also flies out in the open to catch insects on the wing, though much less often than does the Myrtle Warbler.

On a 30-acre tract, mainly of red and white spruces, on Hog Island in Bremen, Lincoln County, Peterson (1942: 27) found the breeding population to be 9, 8, 9, 8, 7, and 7 pairs in the years 1936 to 1941.

Most common associates of this species in migration are the Myrtle and Black-throated Green Warblers.

Remarks. Fewer migrants are seen in fall, as compared to spring, in southwestern coastal counties. This raises a question as to what route they take when leaving the state.

"The food consists largely of beetles, grubs, flies, worms and similar insects. I have seen the birds prying frequently into the deformities on spruce and fir produced by a species of lice-like insects (*Adelges*), and feel very sure that they do good work in destroying these pests, which are becoming very numerous in some sections of the State and injuring the spruce and fir trees" (Knight, 1908b: 514).

Probably the Redstart is the only warbler breeding in greater numbers than the present species in the state as a whole.

Occasionally males are heard singing in the first half of August.

There are discrepancies in the dates, perhaps due to typographical error, in the paper by Stanwood (1910g) cited above. It would seem improbable that the May 13 date for nest building (p. 387) was intended by the author.

Cape May Warbler

Dendroica tigrina (Gmelin)

Summer resident, regularly uncommon on the coast and probably on larger islands from Lincoln County eastward, also in Oxford, Franklin, Somerset, and Piscataquis Counties, and probably elsewhere; *transient*, uncommon to sometimes fairly common throughout in spring and fall.

Spring. Among data at hand, the three earliest records are for May 6, 1897, at Lewiston, Androscoggin County (E. Johnson, 1901: 21), May 11, 1916, at Brunswick, Cumberland County (Walch, 1926: 65), and May 13, 1896, in the Umbagog region [? Me. or N. H. part] (Brewster *in* Griscom, 1938: 569). "They reach Calais as early as the second week in May" (Boardman *in* Baird, Brewer, and Ridgway, 1874, 1: 213). Chamberlain's Presque Isle arrival dates range from May 12 to 23.

Fall. Fuller (1914) reported that, on Monhegan, from August 17 to 28, 1914, "Cape May Warblers were common on the island, from five to six to a score being repeatedly seen on a single outing." Two migrants were taken on August 21, 1876, on Cape Elizabeth (N. C. Brown, 1882f: 1). Other records are scattered rather evenly between this last date and September 21, when one was seen in 1914 on Cape Elizabeth, by N. C. Brown (1915), and the one later record is for several seen by J. Keene on October 2, 1946, at Waldoboro, Lincoln County.

Breeding. In Quebec and New Brunswick, this bird is known to nest as near the tops of tall spruces as it can find dense cover. On June 2, 1936, a nest under construction was found near Ship Harbor, Mt. Desert Island, by Bond (1937b). It was well hidden, against the trunk of a red spruce, four feet down from the top, and 38 feet above the ground. The female was still building on the 3rd, and the male was singing nearby. The nest was examined on June 8 and found to be completed but empty. On June 15, it contained six eggs (? completed clutch), and both nest and eggs were collected. There are records, outside of Maine, for five to eight eggs per clutch. For the Umbagog region, Brewster (*in* Griscom, 1938: 568–569) reported, for May 30 to June 10, 1871: "We took several that were about to lay and one killed June 9 had evidently deposited all but her last eggs." And for 1872: "On June 8 we took a fully formed egg (lacking the shell however) from a female of this species and several killed a day or two later were evidently incubating. The season was a late one and these Warblers seem to be among the earliest species breeding here." The incubation and fledging periods apparently are unrecorded. Probably one brood only is raised in a season.

Ecology. Brewster (*in* Griscom, 1938: 569) reported that these birds were seen "well back in the forest although even then their favorite haunts were certainly spruce-grown pastures similar to those about Lakeside," New Hampshire. The ideal habitat seems to be fairly mature, somewhat openly-spaced, spruces. For a 30-acre tract, mainly forested with red and white spruces, on Hog Island in Bremen, Lincoln County, Peterson (1942: 27) reported the pairs breeding, from 1936 to 1940, as 4, 2, 1, 1, and 1, there being none in 1941.

Near Portland it has been seen during migration in alders close to the ground (Norton). Of three migrants seen one spring in Brunswick, two were with Black-throated Green Warblers in hemlocks, and one was in a mixed flock of warblers (largely Myrtles) in an apple orchard (Palmer).

Remarks. In the Umbagog region the numbers noted by Brewster (*in* Griscom, 1938: 568–569) varied greatly from year to year. The

species was common in 1871, "abundant" in 1872, none noted in 1879, one seen in 1880 and two in 1881, several pairs in 1896 and 1897, and none seen in those years following when he was in the region (his summer visits continued irregularly into 1909). Perry (ibid. 619) found the species there in 1930, 1932, and 1933, but not in 1936. Baird, Brewer, and Ridgway (1874, 1: 213) stated that "in Eastern Maine and in New Brunswick, Mr. Boardman has found it a not uncommon summer visitant, though of irregular frequency. He has no doubt that they remain there to breed." According to Swain (1901b: 27), the Cape May was "unusually common" on May 23, 1900, at Farmington, Franklin County.

Some of Brewster's interesting comments on the habits of this species (*in* Griscom, 1938: 568–569) are as follows: "It keeps invariably near the tops of the highest trees whence it occasionally darts out after passing insects. It has a habit of singing on the extreme pinnacle of some enormous fir or spruce, where it will often remain perfectly motionless for ten or fifteen minutes at a time; on such occasions the bird is extremely hard to find, and if shot is almost certain to lodge on some of the numerous spreading branches beneath. . . In rainy or dark weather they come in numbers from the woods to feed among the thickets of low firs and spruces in the pastures. Here they spent much of their time hanging head downward at the extremity of the branches, often continuing in this position for nearly a minute at a time. They seemed to be picking minute insects from the under surface of the fir needles. They also resorted to a thicket of blossoming plum trees directly under our window, where we were always sure to find several of them. There were numerous Hummingbirds here also, and these, the Cape Mays were continually chasing."

The report (*in* Baird, Brewer, and Ridgway, 1874, 1: 213) of a nest of this species, found less than five feet from the ground at the Richardson Lakes, is open to question. Mead's statements that this species was a common migrant in Cumberland County (*in* Knight, 1897d: 113), and a common summer resident (*in* Knight, 1908b: 501) were certainly erroneous, although the former one might have been true for a single exceptional season. As a matter of fact, the numbers said to be present in summer in several counties, as given in Knight (ibid.), probably were as erroneous at the time they were published as they appear to be now.

Northern Black-throated Blue Warbler

Dendroica caerulescens caerulescens (Gmelin)

Summer resident, fairly common in inland western counties, and uncommon but regular in others; *transient,* common inland and varying

in different years from uncommon to numerous coastwise in spring, and common inland and fairly common coastwise in fall.

Spring. This bird usually arrives in Cumberland County from May 6 to 9, although occasionally not until the 12th. An early date is May 4, 1905, at Portland (*in* Sweet, 1906b: 38). It has been noted as early as May 9, 1909, at Avon, Franklin County (Sweet *in* Legge, 1910b: 53), and two were seen on May 9, 1944, at Ellsworth, Hancock County (Weston). Arrival dates at Presque Isle range from May 6 to 21 (Chamberlain). Migration ends about May 29 in southwestern counties.

Fall. Migration begins by September 9, if not earlier, and is most noticeable during the last 12 days of the month. There are nine records for widely separated points spread evenly throughout the first 22 days of October, and later ones are: one in the week of October 29, 1939, on Monhegan (Mrs. J. A. Townsend); one seen until the last of October, 1899, on Seguin (Spinney, 1900b); and occurrence at Fairfield Center, Somerset County, "upon October 31st and November 1st, 2nd, 3rd and 4th, 1909" (Nye, 1910).

Breeding. This warbler nests in low coniferous growth, mixed coniferous and deciduous undergrowth, and in open woodlands on rather high and moist ground. In the Umbagog region, Brewster (*in* Griscom, 1938: 571–572) found nests in extensive patches of yew (*Taxus canadensis*), located eight to 15 inches above ground, and "with their thick walls of inner felted bark and lining of rootlets," they were readily distinguishable from those of any other warbler nesting in the vicinity. Knight (1908b: 505) recorded a nest from Lincoln, Penobscot County, that was in a low fir tree and three inches from the ground. "The eggs are usually four in number, sometimes five, and quite often only three" (ibid.). Egg dates range from June 3, 1896, for four eggs and incubating female in Magalloway Plantation, Oxford County (Brewster *in* Griscom, 1938: 572), to June 16, 1933, for three eggs, advanced in incubation, taken at Andover in the same county (Harris). Incubation is by the female. In one instance in New York, Kendeigh (1945: 151) found incubation to require 12 days, and fledging nine and ten. Probably one brood only is raised in a season.

Ecology. "The Black-throated Blue Warbler is a bird of the deep woods. It prefers a mixture of deciduous and evergreen trees on damp ground, with more or less young growth. It is inclined to be solitary, although it sometimes associates with other species of Warblers during the migrations" (Sweet, 1906a: 31).

In addition to what has already been stated as to nesting habitat, A. E. Brower reports that this species evidently nests in the bear oak stand on Acadia Mountain, Mt. Desert Island. During spring mi-

gration at Brunswick, Cumberland County, it is seen most often in young hardwoods on low ground along the Androscoggin River (Palmer).

Remarks. This is one of several warbler species that, in spring, may occur in relatively few numbers along the coast in southwestern counties, but, at the same time, are common or even numerous in Oxford, Franklin, and Somerset Counties, and probably elsewhere. About once in a decade, the situation is reversed. In the fall a similar situation exists, for there are larger numbers inland than in the southwestern coastal region. Apparently only a few occur on Monhegan, and on Seguin Spinney saw very few in any season during his years there.

On October 5, 1935, migrants were seen hopping about on rocks close to the water's edge, on Appledore Island in the Isles of Shoals (P. L. Wright, 1937a: 39).

April 19, 1914, as given by Walch (1926: 65) for occurrence at Brunswick, is such an early date for this species that I consider it an error.

Eastern Myrtle Warbler

Dendroica coronata coronata (Linnaeus)

Summer resident, uncommon in southwestern Maine and very common from northern York and Cumberland Counties northward and from Sagadahoc County eastward; *transient,* numerous in spring and sometimes abundant in fall; a few have remained through the *winter* (not recorded recently) in coastal Cumberland and York Counties.

Spring. In Cumberland County, this warbler occasionally arrives by April 15, but more usually, and in fair numbers, by about the 23rd. Migration is at its peak there the first 12 days in May and ceases about the 25th. Two were seen as early as April 7, 1943, at Brewer, and no more until the 24th (Weston); one was seen on April 9, 1939, at Orono, Penobscot County (R. Beaton). At Presque Isle, arrival dates range from April 27 to May 7, with one as early as April 21 (Chamberlain). Boardman (1862: 125) reported the species as arriving April 25 in the Calais region.

Fall. This species begins flocking in early August, the flocks wandering for some time before a southward movement is in evidence. Migration begins in the latter half of August, but is most noticeable from about September 5 to October 20, after which relatively few birds are seen. Knight (1905: 76) stated that he had seen this bird near Bangor as late as November 15. Norton saw one on November

20, 1939, at Isle au Haut, and there are a few records for Cumberland and York Counties, in sections where they have not been known to winter, until December 8.

Breeding. "In the vast majority of cases an evergreen tree is selected as a nesting site, though occasionally some hardwood tree, such as maple, apple or birch, may be taken. A majority of nests seem to be placed in cedar trees, with fir and spruce following as close second choices. The nest may be placed against the trunk, supported on some small branch extending therefrom, or in a fork made by three or more branches or on top of a limb at some distance from the trunk and even near the extremity of the limb. The height of the nest may be as low as four feet from the ground or as high as twenty-five feet, eight to ten feet up being a fair average" (Knight, 1905: 72–73). This species nests often in larches. The nest generally is made of twigs or weed stalks, and lined with feathers; it is bulky and deep for the size of the bird. According to Knight (ibid. 73), the female builds it in about ten days, with occasional assistance from the male.

Knight (ibid.) reported three to five, usually four, eggs to a clutch, with extreme dates, for fresh eggs near Bangor, as May 30 to June 6. On May 26, 1931, four fresh eggs were collected at Kokadjo, Piscataquis County (Harris), and a set of four, much advanced in incubation, was collected on June 27, 1913, at Dedham, Hancock County (Eckstorm). A newly constructed nest was found on July 1, 1941, at Eastport, Washington County (R. F. Miller, 1941: 136). The male rarely assists in incubation, which requires 12 to 13 days (Knight, 1905: 74). The fledging period may be less than the 12 to 14 days given by Knight. A single brood is raised in a season.

Winter. All wintering records to date have been for coastal Cumberland and York Counties, and are as follows: March 21, 1882, one seen at Cape Elizabeth (N. C. Brown, 1882b); January 1, 1885, a severe winter, two shot from a flock of six at Pine Point, Scarborough (Goodale, 1885b); severe winter of 1903–04, several (maximum of six on March 13) on Cape Elizabeth, and one seen ten miles away at Cumberland on February 14 (Brownson, 1904a); 1904–05, perhaps all except one of those wintering on the Cape killed by a Northern Shrike (Brownson, 1905c); throughout December, 1905, some present at Saco, York County (Abbott *in* Brownson, 1906a: 18); 1905–06, some present all winter on the Cape (Brownson, 1906b); December 30, 1906, three seen at Saco or vicinity (S. Abbott, 1907: 15), and at least 20 all that season on the Cape (Brownson, 1907b); 1907–08, maximum number seen on the Cape was five on February 16 (Brownson, 1908a: 13); and December 13, 1928, three seen in Portland (Norton). The species also has wintered at Freeport, Cumberland County (Norton).

Ecology. This warbler is widespread in migration, being found in patches of low bushes, in open hardwood groves, and, perhaps most often, in open coniferous woods or in mixed growth. In fall, when few insects are flying, flocks of Myrtles congregate in thickets to feed on berries. In summer, they prefer areas grown to rather openly spaced low conifers as are found about the edges of clearings where young trees are springing up, in forest glades, and on the slopes of mountains. They feed in trees all the way from the tops to near the ground and dart out often to catch flying insects.

The species nests up to at least 3,000 feet altitude on Mt. Katahdin, and eventually may be found to about 4,400 feet in the scrub spruce on the Tableland there; they nest near the top of Mt. Bigelow (4,450 ft.) in Somerset County. Although the Myrtle nests on inshore islands, it has not been reported as yet on offshore Monhegan. For a 30-acre tract, mainly of red and white spruces, on Hog Island in Bremen, Lincoln County, Peterson (1942: 27) reported the number of breeding pairs, for the years 1936 to 1941, as 7, 5, 7, 7, 6, and 7.

Remarks. Wilson (1810: 139) reported finding this warbler "in great numbers, near the sea shore, in the district of Maine, in October" feeding on bayberries. Goodale (1885b) reported shooting one at Scarborough, and finding the crop full of seeds of pitch pine.

Black-throated Gray Warbler

Dendroica nigrescens (Townsend)

Hypothetical. "Of the Black-throated Gray Warbler, no later records have come to me than the one on the Maine coast, May 18–19, 1936" (S. A. Eliot, Jr., 1938: 10). The manner in which this—the only alleged Maine occurrence—is recorded in print is too vague and indefinite to accept unquestioningly.

Northern Black-throated Green Warbler

Dendroica virens virens (Gmelin)

Summer resident, very common in eastern coastal counties, and common elsewhere, including outer wooded islands; *transient,* numerous in spring and fall.

Spring. This bird usually arrives in Cumberland County from May 3 to 6, and rather rarely by the first. Early dates are: April 26, 1908, at Portland (*in* Brownson, 1909: 85); April 30, 1915, at Brunswick (Walch, 1926: 66); April 30, 1938, at Blue Hill, Hancock

County (M. Brewer); and on May 1, in 1897 at Seguin (Spinney, 1903b: 53), in 1910 at Farmington, Franklin County (Swain *in* Sweet, 1911a: 53), and in 1945 at Hampden, Penobscot County (C. Patterson) At Presque Isle, it has been noted first from May 6 (twice) to 19 (Chamberlain). In southwestern Maine, most migrants are seen between May 4 and 13, and a few females, apparently migrating, have been noted as late as the first week in June.

Fall. In northern counties, birds appear where they have not nested by about August 9, which indicates premigratory wandering. A southward movement is noticeable in northern and central Maine about August 25. Largest numbers are seen along the coast from September 6 to 19, and the last birds generally have departed by October 18. One was seen on October 21, 1918, on Monhegan (Wentworth *in* Jenney, 1919: 29), and another was observed carefully at close range on November 16, 1934, at Bar Harbor on Mt. Desert Island (Mrs. E. A. Anthony).

Breeding. Nests usually are placed near the tops of small conifers and close to the main trunk. "The nests are very hard to locate in the taller trees, but are much easier found in a more open clearing with patches of spruce, fir, and hemlock, where one can follow the birds more easily" (Swain, 1899b: 33). Fifteen nests were located as follows: five in hemlocks, four in firs, two in spruces, two in birches, one in a cedar, and one in a grapevine on the side of a building. They ranged from two and a half feet to twenty from the ground, but Swain (ibid.) reported that he had found nests up to 35 feet. They are made of twigs and bark, with a lining of fine plant material, hair, or feathers, and are well hidden from view.

Laying ordinarily occurs from about May 26 to June 20, and exceptionally as late as the first week of July. Data at hand are for clutches of four, except for one of three and one of five. A pair was seen at Ellsworth, Hancock County, starting to build on May 25, 1908, the male assisting slightly this one day; the nest was completed in four days, but the first egg was not found until June 6; three more eggs were laid on successive days before 9 A.M., and incubation began on the day the last egg was laid, this starting before 10:30 A. M. (Stanwood, 1910d: 292–293). Swain (op. cit.) reported a nest with one egg that was abandoned when a Cowbird laid an egg in it; the pair built another nest and had four eggs by May 30, on Cape Elizabeth. No date was given for the first nest. Mendall found a nest with apparently fresh eggs, plus one of a Cowbird, on July 12, and another, also containing a Cowbird egg, on July 13, 1936, at South Thomaston, Knox County. Incubation, by the female, requires 12 days, and fledging 11 (Stanwood, op. cit. 292–294). Parents were seen feeding

young on August 14, 1930, at Brunswick (Palmer). Possibly two broods sometimes are raised in a season.

Ecology. This warbler is chiefly an inhabitant of coniferous or mixed forests, but resorts to hardwoods extensively in late fall to feed. Although the preferred breeding habitat is second-growth or small evergreens, the bird is found commonly in the tops of hemlocks and spruces in fairly extensive stands of mature trees. In most of these areas in coastal counties east of Cape Elizabeth, on inshore islands, on Monhegan, and at many inland localities, this warbler is the most common breeding one, except where an abundance of *Usnea* gives the Parula a chance to outnumber it locally, or larches and firs provide numerous ideal sites for the Magnolia. The present species feeds in the sunny, exposed parts of trees, generally well out on the branches.

"The bird is quick in its movements, but often spends periods of some length on one tree, frequently coming down low to peep inquisitively at an observer, once in a while flying toward a person as if to alight on his hand or head. This mark of curiosity is shown by both the Magnolia and Black-throated Green, particularly during migration" (Stanwood, 1910d: 289).

For Hog Island in Bremen, Lincoln County, Peterson (1942: 27) reported the number of breeding pairs on a 30-acre tract of mature red and white spruces, for the years 1936 to 1941, as 8, 9, 11, 10, 10, and 10. The Parula was present in equal numbers, and other breeding warblers in diminishing order were the Magnolia, Myrtle, Blackburnian, Redstart, Cape May, and the Bay-breasted.

Remarks. This species has increased markedly as a breeding bird during the last 40 years.

An April 13 occurrence, of this species at Avon (*in* Brownson, 1909: 85), is an error for May 13.

Cerulean Warbler

Dendroica cerulea (Wilson)

Hypothetical. On July 26, 1937, Mrs. W. S. Ames saw two birds at close range at Gardiner, Kennebec County. Her written description of them fits the male and female of this species very well.

Remarks. A. E. Verrill (1862b: 156) stated that this species was very rare in Maine, citing Audubon as authority.

The nearest specimen record is for a male shot on June 5, 1929, at Holderness, New Hampshire, about 30 miles west of the Maine boundary, as recorded by May (*in* Forbush, 1929: 247).

Blackburnian Warbler

Dendroica fusca (Müller)

Summer resident, uncommon to fairly common in all counties; *transient,* on the coast, uncommon to, some years, rather numerous in spring and generally uncommon in fall, and in inland western Maine, regularly fairly common at both seasons.

Spring. This species usually arrives in Cumberland County about May 8, but in some years it has not been seen at Portland until the 18th or even the 23rd. Knight (1908b: 523) stated that it occasionally arrives at Bangor by May 8, and more often by the 12th. Early dates are: May 3, 1942, at Brewer (Weston); May 4, 1905, at Portland (*in* Brownson, 1906d: 68), and also at Skowhegan, Somerset County (Swain *in* Sweet, 1906b: 38); May 5, 1905, (*in* Sweet, ibid.), and May 6, 1906 (*in* Brownson, 1907c: 40), at Portland; and May 8, 1902, at Avon, Franklin County (Sweet, 1904c: 80). For east of Penobscot Bay, early dates include May 13, 1929, on Mt. Desert Island (Mrs. E. A. Anthony), May 13, 1945, at Dedham, Hancock County (Weston) and "the middle of May" at Calais (Boardman, 1862: 125). At Presque Isle, it has been noted on dates ranging from May 14 to June 2 (Chamberlain). In the southwestern portion, migration usually is completed by about May 29.

Fall. In coastal counties, migration has been noticed from August 16 or earlier to September 18. Late inland records are for September 16, 1937, at Jackman, Somerset County (A. R. Phillips), and September 19, 1895, in the Umbagog region (Brewster *in* Griscom, 1938: 580).

Breeding. According to Knight (1908b: 524), this warbler apparently prefers to nest "in the tops of the taller, slenderer spruces, hemlocks and firs not lower than forty feet and generally higher up. An occasional nest is placed on a horizontal limb quite well out from the trunk, but more generally in the dense tufts near the top of the tree and close to the trunks." Nests "may be quite readily located when the birds have young, as both sexes visit them constantly to feed them. The birds are usually building the first week in June and have eggs by the fifth to the fifteenth. More generally four but occasionally five eggs are laid . . . The nests are built as a rule with a foundation of spruce or hemlock twigs, then rootlets, fine shreds of bark, and lined with feathers and fine rootlets."

A set of four eggs, slightly incubated, was collected on June 1, 1898, at Pittsfield, Somerset County, and are in the U. S. National Museum. One set of four fresh eggs was taken on June 2, 1896, and another on June 4, in Magalloway Plantation, Oxford County, one of the nests

being fully 20 feet above the ground (Brewster *in* Griscom, 1938: 581). A clutch of four eggs was found on June 11, 1883, on Mt. Bigelow in Somerset County (Carpenter, 1886b: 130–131), and on June 30, 1936, young out of the nest were seen being fed by the parents, at Gilead, Oxford County (G. Swanson). Incubation and fledging periods apparently are unrecorded. Probably a single brood is raised yearly.

Ecology. This warbler is found mainly in groves of mature, or nearly mature, conifers (generally where there are some hemlocks), even in migration. Knight (1908b: 523) stated that the species is somewhat colonial in breeding habits, a number of pairs forming a loose colony in the deeper evergreen woods. They feed among the branches in the higher parts of the trees.

For a 30-acre tract, covered largely with mature red and white spruces, on Hog Island in Bremen, Lincoln County, Peterson (1942: 27) reported the number of breeding pairs, for the period 1936 to 1941, as 2, 4, 3, 3, 5, and 5.

Remarks. Spinney found this warbler to be a rare migrant at Seguin, but in Cumberland County the status varies greatly from year to year, as does the time of arrival. From limited field experience in southern Oxford County, I believe that one can see more migrating Blackburnians there in spring than elsewhere in Maine. Certainly this is so as compared to the coast in most years. This is one of several warblers that very evidently withdraws from the state in a westerly direction, there being no southward drift or coastal concentration in fall.

That this species is a somewhat colonial breeder probably accounts for the varying reports, ranging from very common to rare, on its breeding status at different localities.

On May 18, 1940, one of these warblers was seen eating tent caterpillars at Scarborough (Norton).

Norton noted the species singing at Chimney Pond (altitude 2,900 ft.) on Mt. Katahdin, from June 13 to 16, 1936, and on the 17th, J. F. Fanning found the mummified remains of a male on the Tableland (4,400 ft.) on the mountain (Palmer and Taber, 1946: 310).

The arrival date of April 15, for Avon (Sweet *in* Brownson, 1909: 85) is an error for May 15.

Chestnut-sided Warbler

Dendroica pensylvanica (Linnaeus)

Summer resident, occasional in some areas of relatively unbroken forest and common elsewhere throughout, including many islands; *transient,* common in spring and early fall.

Spring. This species generally arrives in Cumberland County from May 6 to 8, but in some years not until the 12th. It has been seen on May 6, 1905, at Avon, Franklin County (Sweet, 1906b: 38), May 10, 1944, at Brewer, and May 12, 1941, at Dedham, Hancock County (Weston). At Presque Isle, arrivals have been noted from May 12 to 25 over a period of 20 years (Chamberlain), the average date being about May 16. Migration is completed in Cumberland County by about May 26.

Fall. Migration begins by August 20 or earlier and ends by September 15. The latest inland dates are September 13, 1937, at Jackman Somerset County (A. R. Phillips), and September 26, 1896, in the Umbagog region (Brewster *in* Griscom, 1938: 575). Four were seen near the coast at West Waldoboro, Lincoln County, on October 4, 1946 (Mrs. L. F. Bidwell).

Breeding. Nests are placed in upright forks in sprout hardwood growth and are usually from thirty inches to six feet from the ground. They are made of shredded bark, grasses, and other plant materials, with linings of fine grasses, rootlets, or hair, and are generally rather ragged in appearance on the outside. Knight (1908b: 516) stated that eggs "are laid from June fourth to July fourth but more usually the second or third week in June, and usually four or five is the full complement." Aside for this statement, data at hand for 11 sets indicate four eggs per clutch, except in one instance noted below, and with extreme dates of June 3, 1888, near Portland, and June 19, 1906, at Cape Elizabeth, both of these found by Norton. A set of three, plus a Cowbird's egg, was taken as early as June 6, 1891, at Lisbon Center, Androscoggin County (E. Johnson, 1901: 21), and a fresh clutch was secured by Eckstorm on June 6, 1938, at Holden, Penobscot County.

Outside of Maine, the incubation period has been reported (Burns, 1915: 286) as 10 to 11 days. Fledging probably requires 12 days. One brood is raised yearly.

Ecology. This is a bird of sprout hardwoods and brushy places in such areas as recently cut forests, or in pastures, orchards, edges of swamps, and along watercourses. It feeds from near ground level to the tops in young hardwood trees. It is not markedly gregarious, two or three being about as many as are seen together; it is somewhat social in early fall when a few join the wandering flocks composed of various warbler species.

Remarks. In Audubon's time this bird was so rare everywhere that he had a hard time getting any specimens. Brewster found few of these warblers at Umbagog in his early years there as compared to later. Perhaps having been limited formerly to such habitats as

scrubby growth along watercourses and the brush which springs up where forests were burned by lightning, the nesting habitat of this warbler has increased greatly through the removal of forests by man. The sizeable population in Maine seems not to have changed much in the last 40 years.

A number of Cumberland County observers have reported this species feeding on tent caterpillars.

One of these warblers, believed to have been a young of the year, was seen collecting nesting material, from September 1 to 3, 1937, at Great Head on Mt. Desert Island, by Mrs. E. A. Anthony.

Bay-breasted Warbler

Dendroica castanea (Wilson)

Summer resident, varying in different years from nearly absent to fairly common in suitable localities, including larger islands, except absent from southern York and southwestern Cumberland Counties; *transient,* seldom being very common in spring anywhere, and with fewer fall records.

Spring. This warbler arrives in southwestern Maine from May 11 to 18. Earliest date for the state is May 8, 1904, at Avon, Franklin County (Sweet, 1905c: 63). Over a 20-year period at Presque Isle, this species has arrived between May 20 and 30 (Chamberlain). Migration apparently extends into early June in Cumberland County.

Fall. This species departs almost unnoticed. Among the records at hand, the following, ranging from August 3 to October 6, seem worth recording. N. C. Brown (1882f: 8) stated that he had taken it at Portland "between August 3 and 26." It was seen on September 6, 1939, at Scarborough (Norton); September 9 and 11, 1918, on Monhegan (Dewis, 1919: 40); September 13, 1941, on Mt. Desert Island (A. Dietrich); September 20, 1895, in the Umbagog region [? Me. or N. H. part] (Brewster *in* Griscom, 1938: 576); September 21, 1937, at Jackman, Somerset County (A. R. Phillips); September 28, 1896, in Somerset County (Morrell, 1898a: 21); and October 1, 4, and 6, 1918, on Monhegan (Wentworth *in* Jenney, 1919: 29).

Breeding. A summary of data on 13 nests, for which the sites were described, show them to be located in conifers, away from the trunk, and from ten to 60 feet from the ground, with the exception of one which was only three feet. Although bulky, being made of twigs and lined with dark-colored rootlets or fine grass, they were well concealed. On ten clutches that probably were complete, eight were of five eggs, one was of four, and one of six. A bird was seen gathering nesting

material from June 1 to 3, 1937, at Great Head on Mt. Desert Island (Mrs. E. A. Anthony). The earliest clutch date is June 7, 1896, when Brewster (*in* Griscom, 1938: 577) collected a fresh set of five in Magalloway Plantation, Oxford County; he also collected two fresh sets of five on June 14, 1897, in the Umbagog region (ibid. 578).

Incubation is by the female, and the male brings her some food (Stanwood, 1909: 108; Mendall, 1937b: 431). "The period of incubation was observed to be slightly over twelve days, and the eggs hatched at intervals, with more than two days between the hatching of the first and fifth egg. Two young left the nest at 11 days of age" (Mendall, ibid. 438). This indicates that incubation begins before the clutch is completed. Stanwood (1909: 109) also gave 11 days as the fledging period. One brood is raised yearly.

Ecology. The main inland habitat of this warbler is dense stands of mature or nearly mature firs, spruces, and hemlocks. "In Maine, I have found this species most commonly near the coast in regions where thick growths of spruce and fir have succeeded birches and aspens and where a few of these hardwoods still remain scattered among the conifers. I have seldom observed the bird in the interior of the State, although in Androscoggin County, from 1924 to 1932, a few individuals were regularly noted during their migrations. Here, where spruces are not as plentiful as they are in northern and eastern sections of Maine, the birds showed a preference for mixed growths consisting of birches, maples, firs and pines" (Mendall, 1937b: 429).

In Hancock and Washington Counties, according to Bond (1947b: 23), this warbler occurs in dense spruce woods, "the denser the better. Also swampy and mosquito-infested woods of mixed coniferous-deciduous growth, where it apparently occupies the same niche as the Black-throated Green Warbler." For Ellsworth, Hancock County, Miss Stanwood (1909: 104–105) reported that, among low conifers, this species "gleans from the ground to the topmost twigs, spending much time about midway of the tree, often hovering in air while it snatches its fare from the under side of a branch. When on the ground, it is apparently in pursuit of some insect knocked from the tree. Frequently it picks up an escaping moth on the wing."

For a 30-acre tract, covered largely with mature red and white spruces, on Hog Island in Bremen, Lincoln County, Peterson (1942: 27) reported the number of breeding pairs, from 1936 to 1938, as 4, 3, and 1, with none from 1939 to 1941.

The most common migrant associate is the Black-polled Warbler.

Remarks. It seems appropriate to bring together the scattered reports on local fluctuations of this species.

In early June, 1871, this was the most abundant woodland bird in

the Umbagog region, but by 1879, only one or two pairs could be located; in 1896 and 1897, they were common there, but in a brief visit in 1903, only one singing male was noted (Brewster *in* Griscom, 1938: 576–577). During visits to the same region, from 1930 to 1936, Perry (*in* Griscom, ibid. 619) found this warbler rather common. In [the spring of] 1876, specimens were taken at Portland where the species had not been seen during the previous six years (N. C. Brown, 1876: 95). In 1906, on Cape Elizabeth, several "were seen May 20th and a little later, this being the second consecutive season in which they have come this way" (Brownson, 1906e: 86). For Ellsworth, Miss Stanwood (1909: 103) wrote that this species "appears at about the same time in the spring as the Chestnut-sided Warbler and is [now] about as common, but until 1908, the year I found the bird nesting, I saw it only on the [four] dates indicated in the table, and heard its humble little see-saw song but twice."

For Hog Island, Cruickshank stated, in a letter, that this warbler is "subject to considerable variations in number. Some summers, as 1936, it was a common nester; in some years it is undoubtedly absent. There were 40 pairs on Hog Island's 330 acres in 1936. In 1938 the species virtually disappeared as a nester from Lincoln County. It is now, in 1946, a common summer resident."

Most southwestern inland record for summer, and apparently nesting, occurrence is Dr. Anne Perkins' for Berwick, York County. The westernmost record coastwise is Norton's for Long Island in Casco Bay, on June 14, 1894.

The arrival date of April 24, 1908, by Sweet (*in* Brownson, 1909: 85) is an error for May 24.

Black-polled Warbler

Dendroica striata (Forster)

Summer resident, nests on the Duck Islands off Mt. Desert, also on some inland mountains, but size of population and limits of breeding range unknown; *transient,* varying in different years from uncommon to very common through-out in spring and fall.

Spring. This warbler usually arrives in Cumberland County from May 16 to 23, with migrants seen there until at least June 10. The earliest records for the county are May 10, 1880 (N. C. Brown 1882f: 8), and May 11, 1910 (Eastman *in* Sweet, 1911a: 53), both for the vicinity of Portland. There are earlier dates for elsewhere, as follows: May 1 and 2, 1930, a single male, and May 5, 1928, a flock of about 30 at Great Head on Mt. Desert Island (Mrs. E. A. Anthony); May 7, 1905, at Livermore, Androscoggin County (Briggs *in* Sweet,

1906b: 38); May 9, 1896, at Buckfield, Oxford County (Johnson *in* E. H. Norton, 1902); and May 9, 1905, at Avon, Franklin County (Sweet, 1906b: 38). This bird arrives from May 21 to June 1 at Presque Isle (Chamberlain). Migration does not cease until after the middle of June.

Fall. Although two were seen fluttering about the light on Seguin on August 11, 1898 (Spinney), an actual southward movement apparently does not begin until about September 11. Migrants have been seen regularly from then until October 7 at widely scattered localities. Later records are: October 10, 1888, in the Portland region (N. C. Brown, 1882f: 38); two seen on October 12, 1940, at Farmington Franklin County (W. Drury, Jr.); a large flock on October 17, 1930, at Great Head on Mt. Desert Island (Mrs. E. A. Anthony); one seen on October 23, 1947, at Waldoboro, Lincoln County (F. Bidwell); and one seen, accompanied by a Golden-crowned Kinglet, on November 13, 1928, in cedars on Cape Elizabeth (Mrs. F. Lowe).

Breeding. Knight (1908b: 521) stated that nests generally are built in spruces or firs, four to ten or 12 feet above ground, and that they have a foundation of twigs and are made of lichens, rootlets, and fine grasses, and lined with fine rootlets, grasses, and feathers. Samuels (1865: 411) wrote: "I have two nests in my collection, both found in the northern part of Maine; they were placed in low trees or saplings, and are constructed of, first, a layer of twigs and grass, then the leaves of the pine and moss; these materials are twined into a compact structure, somewhat bulky, and deeply hollowed, and lined with feathers of wild birds and hairs of different animals."

Brewer (*in* Baird, Brewer, and Ridgway, 1874, 1: 250–251) stated that, in the vicinity of Eastport, Washington County [where it does not nest now], and Grand Manan, New Brunswick, this bird nested in the edges of thick, swampy, groves of evergreens, concealing the bulky nest well. Of the nests, he wrote: "They are constructed chiefly of a collection of slender young ends of branches of pines, firs, and spruce, interwoven with and tied together by long branches of *Cladonia* lichens, slender herbaceous roots, and finer sedges. The nests were strongly built, compact and homogeneous, and were elaborately lined with fine panicles of grasses and fine straw. In all nests found, the number of eggs was five." Knight (1908b: 521) gave the number of eggs as four or five per clutch, and added that June 15 to 20 is the "average time to begin looking for eggs and fresh eggs may even be found in early July." R. Miller found four fresh eggs in a nest on June 7, 1933, at Rumford, Oxford County.

For the Grand Manan archipelago, J. P. Norris (1890), reporting on 17 clutches of eggs, recorded ten sets of five, six of four,

and one of three, with dates ranging from June 12 to 21. On Kent Island, in the same group, James H. Veghte studied the nesting of this species, and the following data are used with his permission: two of the nests found were on the ground under spruces (the only ground nests so far reported); four or five days are required for nest building; incubation, mostly by the female, requires approximately eleven days and begins before the last egg is laid, as two days may elapse between the hatching of the first and last egg; fledging requires from eleven to twelve days, with both parents feeding the young; and the male sings throughout the breeding season and even later. One brood is raised yearly.

Ecology. This species differs from most warblers in that, during spring migration, it is no more partial to the type of habitat in which it breeds (coniferous forested areas) than to mature hardwoods. On its way north it is found regularly in the tops of elms, maples, and birches. During the breeding season it apparently is restricted to areas of low, dense, spruces.

Remarks. It is difficult to outline the breeding range of this warbler in Maine. The chief trouble is that the bird is a late migrant, the peak of the spring flight coming in the first week of June, and with stragglers reported until June 20 or later at places where obviously they do not breed. In other words, finding a pair on June 20 is not necessarily evidence of breeding at that locality, even though eggs have been found inland by June 7. Another confusing factor is that males continue to sing throughout the incubation and fledging periods, so a singing male is not necessarily a migrating one. The probability that the breeding range of this warbler in Maine has decreased during the past half century cannot be determined from published statements, since early statements of breeding may refer to late migrants and not to nests actually found. These various matters should be borne in mind when one reads the following three paragraphs.

On the upper Magalloway River in northern Oxford County, I found a few of these warblers at higher elevations during the first half of July, 1945. Mendall saw a pair on June 22, 1938, at Gilead in the same county, and there is the nest found by Miller (see Breeding). Brewster (*in* Griscom, 1938: 579) considered this bird to be only a transient at Umbagog in this same county. For Franklin County, Swain (*in* Knight, 1908b: 520) reported it as a "rare summer resident." In Somerset County, this bird was reported as common on Mt. Bigelow on June 30, 1905 (Sweet, 1905b: 59), as the most numerous bird seen near the summit there in the week of June 16, 1938 (C. D. Adams), and as a rare summer resident in the wilds of the county (Knight, op, cit.). In Piscataquis County, this species was noted on Mt.

Katahdin on June 22 and 23, 1897 (F. H. Allen, 1898: 61), and Mrs. I. H. Blake considered it to be abundant in the scrub spruces on the mountain, during her stay from July 14 through August, 1923. It was stated to be a common summer resident on the mountain (Palmer and Taber, 1946: 310), but much of the data on which this was based were observations in mid-June and could refer to migrants. Yet I have no doubt that it breeds there. About twenty were seen on July 8, 1946, on White Cap Mountain in the Bowdoin College Grant (C. R. Mason). For Penobscot County, Knight (1908b: 520) stated that the bird bred in northern parts and occasionally near Bangor; for the Woolastook [St. John] Valley in Aroostook County, he reported it as a common summer resident. If he was correct, then a marked decline in the breeding population in these counties has occurred since.

This warbler nests on Little (and probably Great) Duck Island, off Mt. Desert (Tyson and Bond, 1941: 37-38, 70). It is not known to nest elsewhere in coastal counties.

This species has been reported in summer, after mid-June, on islands as far west as Monhegan. It does not nest on Mt. Desert, nor on the mainland of Hancock and Washington Counties (Bond). Reports of nesting on the coastal mainland extend back at least to T. M. Brewer's (1867: 121), but even that early report may have been based on seeing late migrants rather than breeders.

The arrival date of April 15, given by Sweet (*in* Brownson, 1909: 85), is a misprint for May 15.

Northern Pine Warbler

Dendroica pinus pinus (Wilson)

Summer resident, rare to perhaps uncommon, chiefly in southwestern counties, and also, apparently, in northern Maine; *transient* in small numbers in spring and fall.

Spring. This warbler arrives in southwestern Maine from April 7 to 16, and has been seen there on these earlier dates: in Cumberland County, on April 2, 1918, at Scarborough (G. Reeves), April 4 of unstated year, at Brunswick (Walch, 1926: 66), April 5, 1903, at Cape Elizabeth (Brownson, 1903: 43); and in York County, on April 5, 1925, at Old Orchard Beach (P. Jenness). The earliest record, however, is for a little farther north at Lewiston, Androscoggin County, and is for March 30, 1902, as reported by Johnson (*in* Sweet, 1904c: 80). Knight (1908b: 532) wrote that this warbler arrived at Bangor from April 16 to 20, and departed by the last of the month. It is uncertain whether scattered May records for Cumberland County are for migrants or

breeders. Spinney, who had seen many of these birds and handled hundreds of dead ones about the light on Seguin, stated (1903b: 54) that about 35 small birds, mostly of this species, were seen there on June 5, 1897, and about ten on the 7th.

Fall. Knight (op. cit.) wrote that migration in the Penobscot valley lasted from late August to the end of September. All other inland data are for birds seen September 10 to October 10, with the exception of one noted below. On the coast, migrants have been noted on September 5 in several years, and thereafter until October 10 to 21. At Seguin in the years 1893 to 1900, Spinney's data indicate that the peak of the flight occurred from September 13 to October 9. Although many excerpts from his journal were published (Spinney, 1903b), the following data from his original journal are of particular interest. After the foggy night of October 5, 1900, he picked up 275 dead birds, mostly of this species, around the lighthouse. A few were seen during the following three nights and on the 9th, "hundreds" were present and quite a number killed, and during the first half of the next night, a few, the last of the season, were seen. Knight (1908b: 532) stated that this warbler was common in fall in the Penobscot valley, but apparently this is not the case throughout the state (see Remarks).

On November 1, 1947, a Pine Warbler came to a feeding station at Hampden, Penobscot County, and remained throughout that month and December (H. P. Hinckley).

Breeding. Swain (1906: 89) wrote that all the nests he saw were located "in smallish pines, at the edge of the taller pines and deep woods, in an old clearing or opening on a side hill where were interspersed a few small oak and some gray birch," that they were placed near the trunk and well up near the top, from 18 to 25 feet above ground, were "neatly and compactly built of strips of bark and weeds, a few roots and bits of dry oak leaves, lined with hairs and a few feathers," and were "not as deep and cup-shaped as the nest of the Myrtle Warbler, but shaped more like the nest of the Magnolia Warbler." Norton once observed a pair of these warblers carrying nesting material, near Portland, on April 30, 1905. Swain (ibid. 88) stated that nest building begins in the latter part of May, which seems nearer to being correct in view of the fact that, according to N. C. Brown (1879: 107) this species "brings out its young" in the vicinity of Portland "by the third week in June." Swain (1906: 89) reported that four eggs were the full complement. The only clutch data are for a set of four, near hatching, found on July 6, 1901, at Livermore, Androscoggin County, by Briggs (*in* Swain, 1901f: 44). I find no data on incubation or fledging periods, nor anything definite on number of broods (probably one) in a season.

Ecology. In Cumberland County, during migration, this bird is found mainly in white pine (*Pinus strobus*) and pitch pine (*P. rigida*), and much less often in other conifers. In fall, they feed quite often in spruces. Fragmentary data would seem to indicate that low white pines or pitch pines are the summer habitat. In feeding, this species "goes creeping in and out the boughs of evergreen trees, much like that relative of his, the Black and White Warbler" (Swain, 1906: 89). It is gregarious and social, joining flocks of Juncos, Hermit Thrushes, and chickadees in spring, and flocks of various small birds in fall.

Remarks. Available data leave great gaps in an overall picture of breeding distribution of this species in the state, especially in the northern and extreme western portions. Even within counties where the bird nests, distribution is spotty. Knight (1908b: 531–532), finding it a rare summer resident in Penobscot County, reported the species as a common migrant in the Penobscot River valley and wondered where these birds nested. No information on this matter has come to light. He indicated (ibid. 531) that the bird bred in all counties except York, Sagadahoc, Somerset, Piscataquis, Aroostook, and Washington. Later, Anne Perkins (1922) reported it breeding in York County. For Mt. Desert Island, Tyson and Bond (1941: 70) considered it a rare transient and probably a local or an occasional summer resident, but more recently, Bond (1947b: 24) wrote that he had never seen the species in Washington or in Hancock County. Although Brewster made many trips to Umbagog, he saw this warbler only once—on June 9, 1903, at Lake Pennesseewassee, Oxford County (*in* Griscom, 1938: 582). I find no records for Aroostook County at any season.

For the Portland region, N. C. Brown (1879: 107) stated that this warbler was an "abundant summer resident," but later (1882f: 8) changed this to: "Common summer resident, somewhat locally distributed, being rarely found in summer except in its favorite pine groves." Considering the rate at which the pine forests have been cut in this region, as well as elsewhere, it is doubtful that the Pine Warbler is now more than locally uncommon anywhere in the state.

One of these warblers was seen eating suet at Brunswick, Cumberland County (Pennell, 1905). The bird that stayed at a feeding station at Hampden, in November and December, fed on peanut butter, suet, and walnut meats.

Northern Prairie Warbler

Dendroica discolor discolor (Vieillot)

Rare visitant, sight records (May 17 to September 17) for Sagadahoc, Knox, Hancock, and Somerset Counties, and evidence of former breeding in York.

Records. "July 24, 1921, I saw a pair of Prairie Warblers feeding young, out of the nest, in a scrub oak barren at Sanford, York County, Maine, and again in the same area July 26, 1922, I saw them. No opportunity to visit that section again occurred until the summer of 1932, when I found that an extensive and very destructive forest fire had consumed all vegetation in the region" (Anne Perkins, 1935).

"On August 5, 1936, Mr. R. T. Peterson and I were astonished to find a Prairie Warbler way out on an ocean rock, Little Green Island [off South Thomaston, Knox County], at the mouth of Penobscot Bay" (Cruickshank, 1938: 551). Perhaps more unusual is this bird's occurrence on June 27, 1945, again about July 1, and on September 17 at Jackman, Somerset County, as reported by Mr. and Mrs. W. Foerster, competent observers. The species was seen in June and July, 1946 and 1947, between Trenton and Ellsworth, and on Mt. Desert Island, all in Hancock County, by Dr. Dale Coman (Bond). One was seen on May 17, 1947, "in the Brunswick area" [actually at Popham Beach, Sagadahoc County], by J. Veghte and Gross (*in* Gross, 1947f: 34, 35)."

Remarks. For over two decades this warbler has been expanding its range in a northeasterly direction from southern New York.

Yellow Palm Warbler

Dendroica palmarum hypochrysea Ridgway

Summer resident, rare in Somerset and common in counties east of there and of Kennebec, and Knox; *transient* in spring and fall, very common on islands and the coastal mainland, and common in the interior, except probably uncommon in Franklin County and rare in Oxford.

Spring. Migration generally starts in Cumberland County between April 11 and 15, earlier dates being for one seen on April 4, 1893, and two on April 4 and 5, 1903, near Portland (Norton), and continues to be in evidence until at least May 22. This bird has been seen as early as April 5, 1910, at Farmington, Franklin County, by Swain (*in* Sweet, 1911a: 53), and April 8, 1910, at Hebron, Oxford County, by Johnson (ibid.). Birds have been noted at the lighthouse on Seguin as early as April 18, 1898, and ten were seen there as late as June 3 (Spinney). Arrival dates at Presque Isle range from April 21 to May 6 (Chamberlain), with an average of April 28. Migration is still in progress after some birds are incubating or even have unfledged young.

Fall. As in spring, migration extends over a fairly long period. "On August 4, 1937, I recorded in my notes flocks along the highway in

Canaan and Hartland, Somerset County, and at Bar Harbor, Hancock County; on August 6, 1937, I wrote 'apparently some migratory movement' " (A. E. Brower). Migration is noticeable in Cumberland and York Counties by the last week in August. Here along the coast, the peak of the flight normally occurs from about September 25 to October 8, lesser numbers being seen thereafter. There are records from scattered localities for October 25, plus these later dates: October 27, 1907, at Portland (*in* Brownson, 1908b: 50); November 2, 1876, in the same region (N. C. Brown, 1882f: 9); November 13, 1941, at Drakes Island, Wells, York County (Norton); and November 29, 1947, at Biddeford, York County (H. Parker and others). As in spring, this species does not occur in numbers inland in western Maine.

Breeding. This warbler tends to be somewhat colonial on its nesting grounds. Although nests usually are placed in moss on hummocks, and under small spruce or larch in heath-grown bogs (see Ecology for details and exceptions), three have been found off the ground. These included one five inches above ground in a spruce bush at Pittsfield, Somerset County, as reported by Knight (1908b: 540), and two at 12 inches in the Bangor Bog, one in a clump of spruce shrubs (ibid. 537), and the other in a small spruce tree (B. W. Barker). Nest building probably begins by May 15, if not earlier.

Usually four or five eggs are laid. The earliest date is for two, plus two Cowbird eggs, found on May 27, 1891, near Pittsfield (Knight, 1904: 39), though much earlier eggs are indicated by the finding of four newly hatched young on May 30, 1892, in the Bangor Bog (Knight 1908b: 536). Latest egg dates are: a set of four, in the U. S. National Museum, that were slightly incubated when found by C. H. Morrell on June 25, 1893, at Pittsfield; and two sets found on June 26, 1905, in the Bangor Bog (ibid.).

Penobscot County data from A. E. Brower are: three nests, two with young (four in one), on May 31, 1936, at Dead Stream Bog near Lincoln; nest with eggs on May 31, 1936, at Passadumkeag Bog; and nest under a little larch on June 20, 1938, in the Bangor Bog, with young leaving by the 24th. "I am satisfied that both parents share in the duties of incubation and both take part in caring for the young" (ibid. 539). Outside of Maine, the incubation period is reported (Burns, 1915: 286) as 12 days. The fledging period apparently is unrecorded. Probably one brood only is raised in a season.

Ecology. In addition to the data given by Knight, the following two paragraphs from A. E. Brower (*in litt.*, 1947) describe the characteristic summer habitat.

"Walter Clayton and I used to try to spend Memorial Day week-end collecting and we generally found two to four nests each day by flushing

the birds. The nests are completely sunk into the wet *Sphagnum*, or *Sphagnum* and other mosses, in the tops of the little hummocks or humps in the *Sphagnum* bogs. The edge of the top of a *Sphagnum*-covered hummock under a little spruce or larch is the favored place for a nest. Sometimes a little grass helped in concealment. Rarely an irregular bunch of grass would provide the shade and concealment for the nest. The nest is made of grass with some vegetable fibers.

"In my experience on the bogs in Passadumkeag, Lincoln, Enfield, and Bangor, all in Penobscot County, the birds greatly prefer the small irregular patches of bog along the edges of open bog, usually cut off more or less by a group or strip of trees; there, under a larch or spruce from one to four feet high, they nest. I have found nests in the more open, regular and more level bog under small trees. I remember a single nest found about ten feet from the edge of the bog under an old brake fern (*Pteris aquilina*), but this is the only one off from the true bog. This nest was in open brushy ground. Later I returned with Clayton who confirmed the identification."

Other types of known nesting habitat include: "old brushy pastures . . . alongside some little knoll" in New Brunswick, adjacent to Calais (Boardman *in* Baird, Brewer, and Ridgway, 1874, 1: 275); "low dry ground, with a thin growth of young hard wood," at Orono, Penobscot County (A. Allen *in* Smith, 1882–83: 445); in a tuft of grass in waste land with scattered patches of gray birches (Swain, 1902a: 40); "bushy pastures and bog" near Bangor (Knight, 1904: 40); a small knoll in a boggy pasture, sheltered by a small evergreen, at Machias, Washington County (Kilburn, 1924: 68); and on high, dry ground in a grove of small pines, in northern New Brunswick (Philipp and Bowdish, 1917: 271).

In migration this warbler may be found in patches of alders, young hardwoods, or in mixed woodlands, and, quite often, in birch trees. It feeds below the tops of the trees down to, and often on, the ground. Another favored place is about the edges of fields and pastures. At this season, it is gregarious and social, small groups of them often accompanying other warblers, as well as Juncos.

Remarks. Quite a number of these warblers migrate over inshore, and even offshore, waters of the Gulf of Maine.

Knight (1904: 36) attempted to discredit early reports of this bird's nesting in Maine. Later (1908b: 535), he went so far as to claim that the "first really authentic record of the actual taking of a set of their eggs was published by the writer" in an earlier publication (Knight, 1893). Because his claim has been accepted widely as the first breeding record for the United States, it seems of interest to note what certain earlier writers had to say. Bonaparte (1828: 13) was the first to state

that this warbler bred in Maine. Boardman (1862: 125) wrote that it bred in the region of Calais, and Samuels (1867: 241) gave a detailed description of a nest and two eggs supplied him by Boardman, from "Northern Maine." It is not certain, however, whether Boardman referred to Maine or adjacent New Brunswick. I have already cited Anson Allen (*in* Smith, 1882–83), whose findings antedate any of Knight's work. An early record, not reported until after Knight's time, is Strong's (1919: 181) report of a set that also contained two Cowbird eggs, collected on June 6, 1885, by Hardy at Penobscot, Hancock County.

"A nest with four eggs found in the bog at Ship Harbor on Mt. Desert Island may be the southermost nesting record of this bird" (Bond).

It should be borne in mind that fall reports of the Western Palm, listed farther on, may be (in several instances) misidentified Yellow Palms.

As checked in Spinney's journal, his latest spring date for Seguin was June 3, not June 7 as stated by Knight (1904: 40).

Western Palm Warbler

Dendroica palmarum palmarum (Gmelin)

Two acceptable *sight records*, plus several reports that are questionable, for fall.

Records. One was seen on September 30, 1898, and another on September 26, 1899, at Bethel, Oxford County, by Brewster (*in* Griscom, 1938: 582).

Remarks. Reports worth mentioning include: one seen by Taber and others on September 12, 1933, at Harrington Lake, in either Township 3 or 4, Range 11, Piscataquis County (Taber, 1945: 370); three seen on November 9, 1941, at Cape Elizabeth (Taber and others); one seen on October 13, 1946, at Bangor (F. Dean); and one seen on October 24, 1947, at Waldoboro, Lincoln County (Mrs. L. F. Bidwell).

Sight records by as competent an ornithologist as Brewster are hardly to be questioned, especially as he had shot four birds of this subspecies (three on September 17 and one on October 9, 1888) on the New Hampshire side of Lake Umbagog, and also was able to compare both subspecies in the same flock in one instance at Bethel.

After examining available data more thoroughly and realizing that fall identification of Palm Warblers to subspecies is not always an easy matter, I am inclined to discredit the reports listed above. Despite the fact that I have aided in the perpetuation of the Harrington

Lake report (Palmer and Taber, 1946: 310), I now would list the subspecies *palmarum* as of hypothetical occurrence, were it not for Brewster's data.

Common Oven-bird

Seiurus aurocapillus aurocapillus (Linnaeus)

Summer resident, common in southern and central Maine, decreasing to uncommon in extreme eastern and northern areas, and apparently absent from all but a few inshore islands; *transient,* common in spring and very common in fall.

Spring. This species generally arrives at Portland from May 6 to 12. The earliest date for that region is May 1, 1891, at Westbrook (Norton). It has been noted on April 23 of unstated year at Lewiston, Androscoggin County (E. Johnson, 1901: 23); May 3, 1910, at Farmington, Franklin County (Swain *in* Sweet, 1911a: 53); and May 5, 1905, at Avon, Franklin County (Sweet, 1906b: 38). Migration reaches a peak in Cumberland County from May 10 to 20, and ends about the 27th. Migrants arrive at Bangor about May 14 (Knight, 1908b: 543), and at Presque Isle from May 15 to 22 (Chamberlain). (See Remarks.)

Fall. Migration begins about the middle of August, reaches a peak from September 8 to 15, and most birds have departed by September 24. Knight (ibid.) wrote that late birds left the Bangor region "the last day or so" of September, and N. C. Brown (1882f: 9) that they remained "until October" in the Portland region. Actual late dates are September 28, 1904, at Avon (Sweet *in* Brownson, 1906c: 64), October 6, 1905, at Cape Elizabeth (Norton), and October 8, "1883" [=1880], at Portland (N. C. Brown, 1882f: 39). (See Remarks).

Breeding. The nest, on the ground in deciduous woods, is made chiefly of dried leaves and leaf skeletons, plus a small amount of hair, moss, pine needles, or twigs. It is unusual in shape, being completely roofed over and having a hole on one side for an entrance. Four or five eggs generally make a clutch, although three have been found partly incubated, and Stanwood (1911b) reported a bird incubating only two. Of 16 clutches for which data are available, the earliest date for a completed clutch of five eggs is May 30, 1894, as reported by Knight (1908b: 544), presumably near Bangor. Most completed clutches have been found from June 3 to 18. Late dates are July 10, 1900, four eggs at East Parsonfield, York County (Norton), and July 13, 1910, four near Ellsworth, Hancock County, that hatched the following afternoon (Stanwood, 1911a: 19). The incubation in one instance was 12 days and the young left the nest in eight days (ibid.). These findings are in agreement with those of Hann (1937: 212) in

southern Michigan, where he found that the young left at eight days, could make short flights at eleven to twenty days, and were fed by an adult until about thirty days of age. One brood is raised yearly.

Ecology. This species is found in greatest numbers on dry ground under young hardwoods where the canopy of branches is complete above, and the undergrowth relatively sparse. It is found in lesser numbers in more open hardwoods, such as poplar or birch groves, and in such spots where the underbrush is dense, where the ground is low or swampy, or where many conifers are intermingled with hardwoods. The nest may be on the forest floor away from any sizeable upright object, or at the base of a bush or fern. This species spends most of its time on the ground.

Remarks. Sight records do not distinguish the races of this bird, and possibly some of the migration data given above refer to the Newfoundland race.

This species is one that obviously has benefitted through the replacement of coniferous forests by hardwoods. The best recorded example of this is for the Umbagog region, where Brewster (*in* Griscom, 1938: 583) found the Oven-bird to be very scarce in the early 1870's, and generally distributed but not common by 1896, and Perry (ibid. 619) found it in increased numbers in 1930 to 1936. The bird was common in 1945, north of Umbagog, about Parmachenee Lake (Palmer).

Boardman's statement (1862: 125) that this bird arrives in the Calais region by the first of May seems more like a guess than a fact.

Northern Water-Thrush

Seiurus noveboracensis noveboracensis (Gmelin)

Summer resident, common in Oxford, Franklin, Somerset, and Piscataquis Counties, decreasing to decidedly uncommon in northern and eastern areas, and rare elsewhere (including some larger islands); *transient,* fairly common in spring and common in fall throughout.

Spring. This bird generally arrives in the western and northern part of the state about May 7, and in Cumberland County from May 10 to 14. The earliest date for the Portland region is May 8, 1906 (*in* Brownson, 1907c: 40), and for east at Seguin, it is May 5 in 1895 and 1902 (Spinney). Earlier dates are: April 28, 1905 (Sweet, 1906b: 38), and April 30, 1908, (Sweet *in* Brownson, 1909: 85), at Avon, Franklin County; May 3 and 5 of unstated years at Presque Isle (Chamberlain); May 5, 1908, at Farmington, Franklin County (Swain *in* Brownson, ibid.); and May 6, in 1904 at Avon (Sweet, 1905c: 64), and in 1905

at Fort Kent, Aroostook County (Morin *in* Sweet, 1906b: 38). Migration continues into early June. A migrant was seen at Portland on June 1, 1918 (Norton), and at Seguin, "many" were seen on May 31, 1901, and a number on June 3, 1897, and one on the 7th (Spinney). The latest record is for June 13, 1947, when O. Hawksley caught and banded one on Machias Seal Island (Canadian territory).

Fall. Migration begins the first week in August and continues to about September 25. Early dates include August 5, 1896, and August 7 and 10, 1898, at Seguin (Spinney), and August 6, 1946, in southern Lincoln County, and the 10th on Eastern Egg Rock in southern Muscongus Bay, Knox County (Cruickshank). The latest date is September 28, 1895, for the Portland region (Norton).

Breeding. Data on nests show them to be placed in cavities under the roots of stumps or trees, in moss on the sides of logs or banks, and one, concealed by overhanging branches, was located under a clump of small hemlocks. Nests are made of grass, moss, rootlets, leaves, or other available plant material, and are, as a rule, fairly well covered above, with an entrance at the side. Clutches usually are completed during the latter part of May, with four or five eggs a normal clutch. Records are: four fresh eggs on May 28, 1893, near Pittsfield, Somerset County (Swain, 1904f: 71); four fresh and five advanced in incubation on May 30, 1896, on the New Hampshire side of Lake Umbagog (Brewster *in* Griscom, 1938: 584); five eggs on June 8, 1861, at Norway, Oxford County (A. E. Verrill, 1862a: 146); two nests, each with four young, on June 9, 1900, near Pittsfield (Swain, 1904f: 71); three eggs, advanced in incubation, on June 23, 1908 (Knight, 1908b: 550), presumably near Bangor; and a "new" nest on June 29, 1941, at Bucksport, Hancock County (R. Miller, 1941: 136).

Outside of Maine, the incubation period is reported (*in* Forbush, 1929: 280) as about 14 days. The fledging period apparently is unrecorded. One brood is raised yearly.

Ecology. I am most familiar with this bird as an inhabitant of the narrow zone of alders between coniferous areas and the open water of ponds and streams. Although it generally is to be found in swamps and along watercourses, it also has been seen in upland woods, on lawns, in gardens, and in the shelter of young spruces on islands. Most of its feeding is done on the ground. Unlike most of the other warblers, this bird is somewhat unsocial.

Remarks. This warbler has been considered uncommon during the fall migration. This is probably due to the fact that it migrates in groups of only a few individuals that generally are overlooked at this time, as compared to the spring season when males are in song.

Brewster (*in* Griscom, 1938: 585) devoted considerable space to describing the flight song of this warbler at Umbagog. One passage is as follows: "1879, May 24.—I discovered this evening that the Water Thrush sings in the air like the Oven Bird. I saw one rise to the height of several hundred feet above the tallest trees and then descend, uttering its usual song, followed by a continued, tremulous, varied, and exquisitely tender warble. This termination is very similar to that of the Oven-bird. The bird descends on an inclined plane."

Josselyn (1674; 1865b: 79) listed the "*Wag-tail*, or *Dish-water*, which is here of a brown colour." It cannot be determined whether he referred to the Water-Thrush or to the Pipit.

Louisiana Water-Thrush

Seiurus motacilla (Vieillot)

One specimen, in the Museum of Comparative Zoölogy at Harvard, was collected in May, 1865, at Norway, Oxford County (J. A. Allen, 1870: 577).

Remarks. Chadbourne (1886) pointed out that the basis for inclusion of this bird in Hamlin's (1865: 170) list of Waterville birds, was a specimen erroneously referred to this species.

Connecticut Warbler

Oporornis agilis (Wilson)

Rare fall *visitant* (August 30 to September 30) in York and Cumberland Counties, there being seven captures and three sight records.

Records. Chronologically by year, data are as follows: one [? seen] on August 30, 1878, on Cape Elizabeth (N. C. Brown, 1882f: 1); one shot in September, 1885, one on September 8, 1866, and one on the 15th, all at Saco, York County (Goodale, 1887b); a female in juvenal plumage shot on September 12, 1894, at Eliot, York County (Knight, 1898e: 8; Howell, 1907); one captured on September 20, 1896, at Westbrook, Cumberland County (Norton *in* Knight, 1897d: 119); a "young female" shot on September 5, 1901, at Westbrook (Norton, 1904c); one or more seen on September 16, 1906, and the next day, one, recorded as a young male [actually a female in juvenal plumage], caught by a cat, on Cape Elizabeth (Brownson, 1906g and 1907a); and one seen on September 7, 1946, at Goose Rocks in Kennebunk, York County (M. and A. Argue).

Remarks. Norton doubted the authenticity of the report by Swain (*in* Brownson, 1908b: 50) that this bird occurred on June 10, 1907, at Farmington.

There is "one record" for September 30, 1890, in the Umbagog region (Brewster *in* Griscom, 1938: 586). Apparently this is a sight record, for there is no specimen of this date in the Brewster collection, and it is not clear whether the record is for the Maine or New Hampshire side of the lake.

Merrill (1882) referred a specimen, taken at Ebeeme Lake in August, 1879, to this species, but later (1886) corrected the error.

Mourning Warbler

Oporornis philadelphia (Wilson)

Summer resident, uncommon (perhaps common in some localities) from southern Oxford to northern Aroostook County, rare in eastern areas, and absent from coastal counties west of Penobscot Bay; *transient*, common in spring and fall in inland western counties, and uncommon but regular elsewhere.

Spring. Most records are for May 27 to June 4, for widely scattered points from Cumberland County northward. Early records are: occurrences for May 16, one in 1904 at Skowhegan, Somerset County (Swain *in* Sweet, 1905c: 64), the other in 1905 at the same locality (Swain *in* Sweet, 1906b: 38); female caught by a cat on May 18, 1918, on Cape Elizabeth (Norton); May 21, 1902, at Waterville, Kennebec County (Swain *in* Sweet, 1904c: 80); May 22, 1903, at Avon, Franklin County (Sweet, 1905a: 44); May 22 of unstated year at Presque Isle (Chamberlain); May 24, 1902, at Avon (Sweet, 1904c: 80); and May 26, 1905, at Avon (Sweet, 1906b: 38). This warbler generally arrives at Presque Isle from May 27 to June 8 (Chamberlain). Late dates are: June 7, 1897, ten seen on the light at Seguin (Spinney, 1903b: 54); June 8, 1938, one at Medomak, Lincoln County (Cruickshank); and June 10, 1937, one on Hog Island in Bremen, Lincoln County (Cruickshank, 1938: 551). According to Brewster (*in* Griscom, 1938: 586), "it is after June 15 in some seasons that the full breeding population has arrived" in the Umbagog region.

Fall. In summarizing Brewster's Umbagog data, Griscom (1938: 586) gave August 24, 1874, as the latest occurrence [? in the Me. or N. H. part], and wrote: "The bird leaves at once after nesting is over, and was almost never noted in late summer. Indeed barring the year 1874, when it lingered in some numbers into August, the Mourning Warbler was encountered on only three occasions from early July on." The bird has been seen as late as August 20, 1937, at Jackman, Somerset County (A. R. Phillips); August 21, 1942, at the base of Mt. Katahdin in Township 3, Range 9, Piscataquis County (Taber, 1945:

371); August 28, 1900, on the light at Seguin (Spinney, 1903b: 58); a bird in juvenal plumage received at Bar Harbor on October 8, 1935, via mail from Cape Elizabeth Lighthouse and in fresh enough condition so that the skin was saved (A. Stupka); and two seen October 15 and 20, 1918, and one on the 21st, on offshore Monhegan (Wentworth *in* Jenney, 1919: 30).

Breeding. After describing a nest containing four incubated eggs, found in June, 1894, at Winslow, Kennebec County, and believed to have been of this species, Swain (1905a: 17–18) wrote of another: "On June 10, 1903, while driving from Athens to Hartland, in Somerset Co., I saw a male Mourning Warbler perched on a limb of a tree, the same tree in which I had seen him in the trip two weeks before. I drove my horse to a house near by and left him and returned to look for a nest. I again saw the male and heard his pleasing song. The locality was a typical place for this Warbler to be nesting. After much search through the underbrush and old raspberry vines, I located the nest, with four eggs in it. . . The nest was quite a bulky affair and placed at the base of a clump of coarse weed stalks about six inches from the ground. The outer nest was of dry leaves and vine stalks. The nest proper was made up with a thick outer wall of dead, coarse, flat-bladed grass, with finer grasses and a few weed stalks, and all through this outer wall was interwoven a few small, dead, white maple leaves. The inner wall was composed of fine grasses, and the interlining contained a few horse hairs. It was a very neat, compact nest, well built to protect the eggs from the dampness from the moist ground, where it was placed. . . The eggs, four in number were fresh."

R. F. Miller has found three sets of four eggs, in nests, as follows: fresh sets at Andover, Oxford County, one on June 5, 1933, in a clump of *Ledum*, and the other on June 11, 1934, in a clump of *Solidago*; and a set, advanced in incubation, on July 1, 1941, in a nest three inches off the ground in a tussock of grass, at Whitneyville, Washington County. G. M. Allen (1909: 200) gave June 16 as a date for eggs in Maine (but see Remarks). The incubation and fledging periods apparently are unrecorded. Probably one brood only is raised in a season.

Ecology. In migration this warbler frequents brushy places in woodlands (Norton), but it also is seen in a variety of other situations. "Soon after arrival it may be observed, but a pair in a place, feeding about the dense underbrush on the margin of some low-land woods or second growth swamp, or on some side hill, covered with brush, near a deep-wooded ravine, and soon after its arrival it begins its nest building" (Swain, 1905a: 15). Batchelder (1882: 110) stated that around Fort Fairfield, Aroostook County, this species "was almost sure to be found in 'burnt lots', where the fallen trunks lay, half

hidden by a luxuriant growth of tall weeds, or thickly overrun with vines." Today, Fort Fairfield is surrounded by potato fields, the brush and forest having been removed, but the bird is found in brushy places on the upper St. John River.

In his notes for June 3 to 14, 1872, Brewster (*in* Griscom, 1938: 586) wrote: "Common in a rather limited locality on the side of Upton Hill [Oxford County]. They haunted brush fences, old log heaps, and thickets of raspberry bushes, rarely far from the woods and usually along their edges. Sometimes a pair would be found in some small but sunny opening well within the forest, but never actually under its gloomy shade. . . Several males were shot in the very tops of the tallest beeches and birches along the wood edges at least seventy or eighty feet above the ground." Bond (1947b: 24) stated that in Maine this bird's habitat is "clearings with tangled growth of raspberry bushes."

Remarks. The southern limits of the summer distribution of this bird are not well known. In 1928 a pair was believed to have nested at Berwick, York County (Anne Perkins), and in 1901, a pair nested at Winslow, Kennebec County (Swain, 1901d: 29). One was seen at Bremen, Lincoln County on July 20, 1939 (Cruickshank, 1938: 551).

The only reference to eggs in Maine for June 16 previous to that of G. M. Allen (1909: 200), cited above, is that of Chapman (1907: 249), who included, in his nesting data for this species, "between Athens and Hartland, Me., June 16 (Knight)." Since the locality is the same as given above for the June 10 record (under Breeding) by Swain, I think it safe to conclude that "June 16," as given by Chapman is a misprint for June 10. This also would explain Allen's use of the later date.

Northern Yellow-throat

Geothlypis trichas brachidactyla (Swainson)

Summer resident, rare in some areas of relatively unbroken forest and fairly common elsewhere throughout, including many islands; *transient,* very common in spring and fall.

Spring. This bird arrives in western counties from May 6 to 9, generally about as early in Franklin as in Cumberland. The two earliest dates are for the latter county and are for a bird seen on April 26, 1930, at Brunswick (Palmer), and one on May 3, 1927, at Portland (Mrs. L. R. Brown). One was seen as early as May 9, 1945, at Corea, Hancock County, by Weston. Arrival dates at Presque Isle range from May 11 to 26, with one early record for the 9th (Chamberlain).

In southwestern counties, migrants are seen in greatest numbers from about May 12 to 23, with decreasing numbers (mostly females) to May 31. At Seguin in 1897, migrants were seen about the light on June 3 and 5, and "many" on the 7th (Spinney, 1903b: 54).

Fall. Migration is mainly in late August and throughout September. One bird was seen on the light at Seguin on August 11, 1898 (Spinney), and the next earliest date there, also for a single bird, is August 28, 1895 (Spinney, 1903b: 53). The latest date for well inland is for one seen by A. R. Phillips on October 10, 1937, at Jackman, Somerset County, and there are scattered dates to October 12 for more southerly points. Later records are: a "few" seen on October 13, 1899, at Seguin (Spinney); October 13, 1910, at Ellsworth, Hancock County (Stanwood *in* Sweet, 1911b: 66); one on October 13, 1941, at Dallas Plantation, Franklin County (W. Taber); one on October 14, 1917, at Portland (Norton); and a series of dates for offshore Monhegan, of which the latest are for two birds on October 13, 17, and 19, one on the 23rd, and three on the 24th, in 1918, as reported by Wentworth (*in* Jenney, 1919: 30). An unusual occurrence was that of a bird, believed to have been a young of the year, seen on December 8, 1932, near Back Bay in Portland, by Norton and W. L. Holt.

Breeding. The nest, well concealed from above by overhanging vegetation, usually is found on the ground or close to it, in patches of rank vegetation, including cattails and even heaths and sedges, in damp places. Rather large for the size of the bird, it has a deep cavity, and is composed of pieces of wide grasses, rushes, leaves, or strips of bark, with a lining of fine grasses, rootlets, or hairs. "Nest building requires a week to ten days and an egg is laid each day until the set of three to five eggs is completed" (Knight, 1908b: 561). For Androscoggin County, E. Johnson (1901: 23) wrote: "May 28 is the earliest I have found a full set of eggs and June 8 the latest." Knight (1908b: 560) gave June 12 for the latest date for eggs to be laid, but Norton found a set of four, advanced in incubation, on July 15, 1895, at Westbrook, Cumberland County.

"Incubation requires twelve days, occasionally slightly longer in cold, wet weather. The young leave the nest in fourteen to fifteen days" (ibid. 561). Probably one brood only is raised in a season.

Ecology. "In the breeding season they are found in the meadows, cattail bogs, bushy bordered streams and ponds, wet bushy pastures and in general similar situations, no matter how limited in extent, which afford moist, sunny, grassy or sedgy, bushy localities" (ibid. 559). In migration, especially in spring, they often are seen in orchards, and about the edges of young hardwood thickets and in similar dry situations.

Remarks. There are no data to indicate that this bird has increased or decreased over any sizeable area. Local variations probably can be accounted for by the changes in habitat due to plant succession.

Yellow-breasted Chat

Icteria virens virens (Linnaeus)

Rare *visitant* (May 16 to December 10), having occurred in York, Cumberland, Sagadahoc, Lincoln, and Hancock Counties, there being a total of eleven records from 1876 to 1948.

Records. A specimen was taken in June, 1876, at Eliot, York County (Smith, 1882–83: 445); a male was shot on June 6, 1880, at North Bridgton, Cumberland County (Mead *in* Knight, 1897d: 120); the remains of one were found in fall, probably in September, 1893, in Portland (N. C. Brown, 1894); one was killed on October 5, 1900, on the light at Seguin (Spinney, 1902b: 44); one was seen on June 10, 1902, at Portland, by Brownson (*in* Sweet, 1904c: 80); one was seen on June 16, 1937, in Portland (G. Sharpe); one was seen that sang regularly from June 23 to July 10, 1939, and one on August 28, and another was seen on June 14, 1941, at Bremen, Lincoln County (Cruickshank); one was seen on May 16, 1942, at Kittery, York County (A. Comey); one appeared on December 1, 1944, and remained for ten days in the Great Head Sanctuary on Mt. Desert Island, where it fed on fruits of bittersweet and other shrubs (Mrs. E. A. Anthony); and one was observed from May 16 to 23, 1948, at Falmouth, Cumberland County, which Rich identified (Gross, 1948b: 73).

Hooded Warbler

Wilsonia citrina (Boddaert)

One specimen (fall) and *three sight records* (one spring and two fall).

Records. An adult male was seen on September 9, 1904, and collected the following day, at Falmouth, Cumberland County (Brownson, 1904b and 1905a); a pair was seen from September 16 to 18, 1917, at Fryeburg, Oxford County, by Miss H. Abbott; one was seen on May 18, 1918, at Gorham, Cumberland County, by Mrs. H. Lombard (Forbush, 1929: 304); and one was seen on September 6, 1943, at Lake Wassookeag, Dexter, Penobscot County (Mrs. H. Farnham).

Wilson's Pileolated Warbler

Wilsonia pusilla pusilla (Wilson)

Summer resident, fairly common in eastern parts of Piscataquis and Aroostook Counties, and in Penobscot, Hancock, and Washington Counties (common about Bangor and in eastern Washington County), and apparently rare elsewhere inland; *transient*, fairly common throughout in spring and fall.

Spring. This species generally arrives in Cumberland County from May 10 to 12. The earliest date is for May 7 of unstated year at Lewiston, Androscoggin County, as reported by E. Johnson (1901: 23). Arrival dates at Presque Isle range from May 16 to 26 (Chamberlain). Migration continues until June 1 in Cumberland County (Norton), and one was seen on June 5, 1897, and two on the 7th, on the light at Seguin (Spinney).

Fall. Migration begins by the middle of August, there being several August 15 dates for southwestern coastal counties. Most birds are seen during the first half of September. Spinney (1903b: 56) noted a migrant on September 24 and 27, 1898, at Seguin, and Audubon (1834: 149) reported seeing "considerable numbers" in northern Maine in October, 1832. The only recent report for that month is for one seen on October 11, 1947, at Jefferson, Lincoln County, by S. Higginbotham.

Breeding. Data on Maine nests indicate that the site is quite similar to that of the Yellow Palm Warbler, although in slightly more brushy situations such as in alders. The nest, placed on the ground at the base of a shrub in a boggy or swampy area, is made of grass or other plant material and lined with a few rootlets, the whole structure being thin and frail. Maine data are as follows: five eggs on June 1, 1902, at Hermon Bog near Bangor (Swain, 1904c: 62); four eggs, advanced in incubation, on June 4, 1897, and four nearly fresh on June 12, 1892, at Pittsfield, Somerset County (Morrell, 1899f); four fresh on June 19, and four young which left the nest about the 29th, 1900, near Bangor (Swain, 1904c: 61). "June 23 [1879] Mr. Dwight caught a young bird, just able to fly two or three yards at a time," at Fort Fairfield, Aroostook County (Batchelder, 1882: 110). On July 9, 1910, a pair of adults, the female carrying food, was observed at Ellsworth, Hancock County (Stanwood, 1910f). The incubation and fledging periods apparently are unrecorded. Probably one brood only is raised in a season.

Ecology. Bond (1947b: 24) stated that, in Maine, this species frequents alder-covered hillsides and alder swales in open country, and that he had not found it "occurring with the Canada Warbler, except

in alder swamps bordering the Bangor Bog." Swain (1904c: 62) wrote: "Wilson's Black-cap is often seen in company with the Canadian Warbler during the migration season. Their manner of feeding somewhat resembles that of the Canadian species. They feed in briery thickets, picking up insects very nimbly. They . . . capture much of their food on the wing, but do not like the Flycatcher return to the same perch."

Remarks. Bond (op. cit.) stated that this species "is most numerous in summer in eastern Washington County, where it is probably more numerous than elsewhere in New England." Mendall agrees with Bond that this warbler is very common in eastern Washington County, but he has found even more about Bangor.

R. F. Miller (1941: 136) reported a set of four eggs of this bird, but he writes me that they were of another species.

Canada Warbler

Wilsonia canadensis (Linnaeus)

Summer resident, fairly common in the interior and in eastern counties (including some islands), but decreasing to rare in, or absent from, coastal counties west of Penobscot Bay; *transient,* fairly common throughout in spring and fall.

Spring. This warbler usually arrives in western counties about May 10 to 12. Earlier occurrences are: April 24, 1914, at Brunswick, Cumberland County (Walch, 1926: 67); April 25 at Bangor (Knight, 1908b: 571); May 1, 1910, at Farmington, Franklin County (Swain *in* Sweet, 1911a: 53); and, in 1902, May 7 at Waterville, Kennebec County (Swain *in* Sweet, 1904c: 80), and May 9 at Livermore, Androscoggin County (Briggs *in* Sweet, ibid.). Arrival dates at Presque Isle range from May 20 to 30 (Chamberlain). In Cumberland County, the largest numbers of migrating birds generally are seen from about May 18 to 25, and migration apparently ends there about May 31. Spinney noted migrants at Seguin on May 30 and 31, 1901.

Fall. The small amount of data available indicates that most birds are seen during the last ten days of August, with a few records for the first week of September. Later dates are: for Somerset County, September 10, 1937, at Jackman (A. R. Phillips), and September 12, 1897, at Pittsfield (*in* W. Cooke, 1904: 60); September 25, 1889, in the Umbagog region [? Me. or N. H. part] (Brewster *in* Griscom, 1938: 588); and two seen on October 31, 1936, at Cutler, Washington County (Mendall).

Breeding. Of this species, Knight (1908b: 571–572) wrote: "In the nesting season as far as my observations go they resort to the deeper

woods which are thick overhead and more open underneath, mossy carpeted, dotted with clumps of ferns and reeking with moisture. Here the nests are placed, at the foot of a clump of ferns, on a mossy hummock, under a log, in the upturned roots of trees very near the ground, and in general similar situations, always near the ground. . . The nests are composed of fine strips of bark, dead leaves and moss, lined with fine black rootlets. The eggs are four or five in number . . . As nests I have found from May thirtieth to June twentieth have contained young, I would infer that eggs might be found in late May and early June."

The earliest specific dates for eggs are for five on May 22, 1833, near Eastport, Washington County, as reported by Audubon (1834: 19), and one on June 1, 1930, to which four more later were added, at Great Head on Mt. Desert Island (Mrs. E. A. Anthony). A set of five, in the U. S. National Museum, was slightly incubated when collected by C. H. Morrell on June 6, 1899, at Pittsfield, and four fresh eggs were collected by A. Weston on June 12, 1930, at South Andover, Oxford County. In the Umbagog region, Brewster (*in* Griscom, 1938: 589) found a nest with four fresh eggs on June 18, 1876, and reported a bird incubating on another nest on June 20, 1879. A nest with four eggs was found on June 20, 1910, at Ellsworth, Hancock County (Stanwood, 1911c: 48). The incubation and fledging periods apparently are unrecorded. Probably one brood only is raised in a season.

Ecology. Bond (1947b: 23) reported that, in Maine, he found this species occupying "dense, swampy woodlands." (Also see comments on summer habitat under Breeding). In my own experience, I have found this warbler occurring most often in spring in bushes, such as thickets of heaths, near woods in very wet localities. Yet, not infrequently in migration, it is seen in a wide variety of situations, associating with other warblers. In his Umbagog notes for 1896, Brewster (*in* Griscom, 1938: 589) reported that during migration, this species frequented "high and low ground and all sorts of forest growth indifferently, the only essential being the near presence of moss-covered ledges, boulders, or steeply sloping banks."

"The Canada Warbler has a tendency to keep low down in a thicket, where from a perch on a dead branch it has perfect freedom to catch insects on the wing. Frequently, however, it feeds in the treetops" (Stanwood, 1911c: 48).

Remarks. In addition to mainland nesting records, at least one pair bred at Islesboro, Waldo County, as reported by R. Howe (1901: 15), and Mrs. Anthony (*in* Tyson and Bond, 1941: 71) reported finding a nest on Mt. Desert Island, as mentioned under Breeding.

American Redstart

Setophaga ruticilla (Linnaeus)

Summer resident, uncommon in some inland areas of relatively unbroken forest and very common elsewhere throughout, including islands; *transient,* common to rather numerous throughout in spring and fall.

Spring. This warbler generally arrives in western counties from May 6 to 10. Earlier occurrences are: May 3, 1908, at Bowdoinham, Sagadahoc County (Robinson *in* Brownson, 1909: 85); May 4, 1902, at Lewiston, Androscoggin County (Johnson *in* Sweet, 1904c: 80); May 4, 1904, at Skowhegan, Somerset County (Swain *in* Sweet, 1905c: 64); and May 5, 1905, at Hebron, Oxford County (Johnson *in* Sweet, 1906b: 39). It arrives at Presque Isle from May 16 to 26 (Chamberlain). Most migrants are seen in Cumberland County from May 14 to 22, with decreasing numbers until about May 29. Spinney (1903b: 54) noted this species on the light at Seguin as late as June 5, 1897.

Fall. Migration begins about August 11, but is most conspicuous from September 4 to 18. The last birds usually have departed by September 30, but there are these later occurrences: October 9, 1876, in the Portland region (N. C. Brown, 1882f: 10); October 8 and 9, 1918, on offshore Monhegan (Wentworth *in* Jenney, 1919: 30); October 10, 1888, in the Umbagog region [? Me. or N. H. part] (Brewster *in* Griscom, 1938: 589); and October 13 of unstated year and locality (G. M. Allen, 1909: 204).

Breeding. "The nests are placed quite variously, sometimes thirty to forty feet from the ground in the crotch of a maple or elm, occasionally in some other hardwood tree at a good elevation, but more frequently the nests are placed lower down at heights varying from six to eighteen feet, in second-growth maple, or in willow, poplar and elm saplings along the bank of a river or stream and in a thicket." One nest was "composed of fine, silken vegetable fibers, willow cotton, and fine thread-like bark, mixed with numerous spiders' cocoons, held together with spider's web, and lined with fine grass and a few feathers . . . In general, the nests are always well cupped and firmly and compactly built . . . Four or five eggs seems to be the usual number laid . . . In general it takes a week or ten days to build the nest, and the female attends to this as well as the task of incubation" (Knight, 1907: 34-35).

Records at hand for 13 clutches, believed to be complete, are for one of three eggs, eight of four, and four of five. The earliest date is for a set of four found on June 4, 1887, at Westbrook, Cumberland County

(Norton), and the latest for a clutch, found by E. Johnson (1901: 23), on June 30 in Androscoggin County. "The incubation period is sometimes only twelve days, though I have known it to take fourteen for the eggs to hatch. The young leave the nest in fourteen days, as a rule. Only one brood is reared in a season with us" (Knight, 1907: 35). Other observers elsewhere have found that incubation is nearer 11 days, and fledging 8 or 9, rather than the longer periods given by Knight.

Ecology. In addition to what has been said about habitat above, it may be pointed out that the Redstart also nests in alder thickets and patches of saplings of almost any hardwood species. Ideal situations are the young birches and aspens which form one of the stages in plant succession, about eight to 15 years after the removal of coniferous woodlands. Peterson (1942: 27) has pointed out the utilization of this stage by the Redstart at Hog Island in Bremen, Lincoln County. The same type of area, a few years later when scattered groups of young conifers have attained nearly the same height as the hardwoods, is an almost equally favored breeding habitat.

In his Umbagog notes for 1896, Brewster (*in* Griscom, 1938: 589) wrote of the Redstart: "One of the most abundant and universally distributed birds of this region, quite as numerous in the heart of the forest on high ground as along rivers and about clearings frequently in the forest thickets of mountain maple in windfall openings and along old logging roads."

Remarks. The summer resident population of Redstarts may have decreased slightly over the past twenty years. Even so, it probably is the most abundant warbler breeding in the state.

In June, 1924, a female Redstart was observed building a nest at Gardiner, Kennebec County, by Mrs. J. M. Morrill. In the absence of the builder, another female Redstart came repeatedly and carried off parts of the nest, the owner appearing not to notice the loss. An egg was laid on June 11, the second on the 13th, and the third on the 14th. On the last date, a Cowbird added an egg that Mrs. Morrill removed on June 15. On the 16th, the nest was partly destroyed, either by wind or a predator, the three eggs being thrown to the ground, but that same afternoon the female laid another egg in the remains of the nest.

Morrell (1899c) probably was referring to tent caterpillars when, in reporting an unusual abundance of these insects, he wrote: "I know of two Redstarts' nests which have been deserted after eggs had been laid, because the caterpillars took possession and it seems probably that many other birds which build in deciduous trees will be driven from their nests."

Family PLOCEIDAE

European House Sparrow; English Sparrow

Passer domesticus domesticus (Linnaeus)

Introduced, a common to numerous *resident* in centers of human population throughout, except absent from almost all islands.

Breeding. The dancing performance wherein several males dance around a female who pecks at them, is in evidence from at least December to August in Portland (Norton). The relation of this performance to breeding is not clear. Males have been seen mounting females there as early as the second week in February, and nest building commonly is observed from mid-February on, especially in mild spells of weather. The site is located from about six to 20 feet from the ground, and usually is inaccessible to predators and humans. Either sex may choose it and both visit it together, but the female does most of the building. The nest is an untidy heap of twigs, weeds, pieces of cloth, and similar debris, in a gutter pipe, in vines on houses, in a tree, or heaped on some projection under the shelter of eaves, bridges, parts of signboards, and in similar situations. The amount of material carried into bird houses or holes in trees is less, sometimes consisting largely of hay, dry weeds, and shed pigeon or hen feathers; the feathers often are used to line the larger outside structures also. An outside nest is roofed over, with an entrance on one side. Apparently the same nest sometimes is used for successive broods, and in successive years, and at other times, it is changed, or torn apart and the material used elsewhere.

Generally three to six eggs are laid. "Incubation requires fourteen days in the early part of the season, and only twelve days in summer. The young leave the nest in thirteen to sixteen days according to the weather and season" (Knight, 1908b: 393). A young bird, several days old, picked up on March 28, 1919, in Portland, indicates an earlier breeding record than any egg dates at hand. The last young are fledged in early August. Two, and perhaps sometimes three, broods are raised yearly, but probably never as many as five, as believed by Knight (ibid.).

Ecology. This species is restricted to the vicinity of human dwellings, especially where there are numerous houses, as in cities, towns, and hamlets, but some also winter about farms. Most of their food is gotten on the ground. The birds spend the non-breeding months in flocks, and are rather social at all times.

Remarks. This bird was introduced into Maine at Portland in 1854 by W. Rhodes (1877), and again in the fall of 1858 by Dr. T. A. Deblois (Barrows, 1889: 18). Of the latter introduction, Brewer (*in* Baird,

Brewer, and Ridgway, 1874, 1: 526) wrote that the birds nested successfully the following year and were quite abundant for a while in the area where released; also he stated that "a large colony of this Sparrow appeared in the winter of 1871 in Rockland [Knox County], Me." Norton (1906b) reported: a third liberation in Portland was made subsequent to that by Dr. Deblois; another, during the early seventies, was made by "the late Bishop Neely and Mr. Geo. T. Shepley"; none of these liberations, as far as he knew, was wholly successful; and it was not until after an 1875 introduction that this sparrow became established in the region.

In 1874, twelve birds were liberated at Lewiston, Androscoggin County (Barrows, 1889: 20). In his notes of 1875, Nathan Clifford Brown observed: "A correspondent in Berwick [York County] writes that a great many English Sparrows are seen this winter in that vicinity." About 1876, the species was present at Fairfield, Somerset County, and the same year, or earlier, it was introduced at Bangor (ibid. 20, 211). A few years later, Hardy (1881) stated that it had visited Brewer, across the Penobscot, "in winter for the past two years," but that he had seen none there later than March, and Merrill (1881c) reported it nesting in Bangor in 1881. About 1889 this bird was in Farmington, Franklin County; in 1883, at North Livermore, Androscoggin County, at Belfast in Waldo County, and at Damariscotta in Lincoln County; in 1884, at China in Kennebec County; and by 1886, it had spread as far as Houlton, Aroostook County, thus covering most of the state, although still absent from some places (summarized from Barrows, 1889: 211). As to 'down east,' Boardman (1903: 2nd nunumbered page after 272) wrote to Robert Ridgway from Calais on November 24, 1884: "Last fall for the first time we had a lot of English Sparrows come to see us and now we have quite a good supply." This species apparently was introduced for the purpose of controlling insect pests.

As one would expect, the data above show that the spread to new places occurred in fall or winter — the season when the birds were gathered in flocks and unattached to nesting territories. The birds reported from Berwick and Calais may have been from numbers liberated beyond our borders.

At least 30 years ago the peak of numbers was reached and a slow decline in the population subsequently has taken place.

In a study of variation of this sparrow in the United States, Calhoun (1947: 221) pointed out that a series of very small specimens from Presque Isle did not fit the general pattern, which he had found to exist, of a gradient toward larger size in colder areas where the species is resident. He suggested that this particular population might be an

isolated one, but I rather doubt that genetic isolation is involved in this reported smallness. The matter needs further study.

Family ICTERIDAE

Bobolink

Dolichonyx oryzivorus (Linnaeus)

Summer resident, fairly common in settled areas throughout, including a few large islands, but diminishing somewhat in numbers in eastern counties; *transient,* common in spring and early fall.

Spring. This species generally arrives in Cumberland County about May 9. The two earliest dates there are for May 5, 1906, at Westbrook (S. Hacker), and May 6, 1928, at Cape Elizabeth (C. Mower). It has been seen as early as May 7, 1944, and May 11, 1947, by Mrs. P. Hannemann, at Hampden, Penobscot County, and May 13 at Presque Isle, by Chamberlain, although it generally arrives at the latter place from the 14th to 24th. Migration apparently ends in southwestern Maine by June 4, but continues until the middle of the month in northern counties.

Fall. Migration begins by the second week in August, if not earlier. Spinney noted the species at Seguin as early as August 10 and 11, 1898. Most birds usually have departed by September 11, but one or more was seen on the 19th in Bowdoinham, Sagadahoc County, and one was caught by a cat on September 28, 1882, at White Head Island, Knox County (Norton), and one was seen as late as September 29, 1921, at Brunswick, Cumberland County, as reported by Walch (1926: 58).

Breeding. Of this species, Knight (1908b: 339) wrote: "The nest is placed on the ground at the foot of a tuft or tussock of grass, sedge, or a small bush in a field or meadow. It is composed of fine grass and fine weed stems, lined with finer material of the same nature. The female seems to do all the work of building and incubating, but the male does some little towards feeding the young." Data are at hand for ten sets of eggs, ranging from five to seven per clutch. The earliest date for a set, of six fresh, is June 2, 1939, at Brewer (Eckstorm), and the latest dates are: a set of five with incubation begun, on June 20, 1887, at Westbrook (Norton); and five fresh on June 23, 1924, at Greene, Androscoggin County (Mendall). Young have left the nest as early as June 22, 1890, at Westbrook (Norton). Outside of Maine, the incubation period has been reported (Burns, 1915: 285) as ten days. The fledging period apparently is unrecorded. Only one brood is raised yearly.

Ecology. The Bobolink is a bird of damp meadows, or drier, rather uneven, fields where there is a good growth of clover or hay. About July 15, after the close of the breeding season, the birds gather in flocks on low ground about grain fields and on salt marshes along the coast.

Remarks. In a letter to William Bartram, dated October 11, 1809, Wilson wrote that "the people of the District of Maine, of all of the New England States, and those who have lived on the river Illinois, declare that these birds breed there in vast numbers" (Ord, 1828: ci). There is other evidence, including data from older persons now living, that this bird formerly was much more numerous than at present. Further, there have been many local changes in breeding distribution right up to the present time. Long ago, Hardy (1881) reported this species getting scarce at Brewer, but it now is present there in fair numbers. The overall picture in recent decades, however, is of a marked decline beginning perhaps about 1905, but which has lessened so that it has been relatively slight during the past decade.

An item in the *Portland Evening Express* of June 5, 1931, under the heading of "Fifty Years Ago," reads as follows: "Many people in this vicinity are engaged in trapping bobolinks and linnets for the market."

Eastern Meadowlark

Sturnella magna magna (Linnaeus)

Summer resident, fairly common in coastal counties to western Penobscot Bay and north to the southern sections of Oxford, Franklin, Somerset, Piscataquis, and central Penobscot Counties, diminishing to rare in, or absent from, much of northern and eastern Maine; *winter resident,* uncommon and local, chiefly near the coast.

Spring. Birds begin arriving in Cumberland County about March 5, with most seen between the 14th and 26th, and numbers decreasing to late April when only the breeding birds are seen. The species generally is well distributed throughout its range in the state by March 26. As a rule, they travel in small flocks at this time, but on March 9, 1942, a flock of about 75 was seen near Portland by Norton.

Fall. Migration may begin in early September as flocks are seen moving about at this time. Most migrants depart in October and the first week of November, with records by no means uncommon to November 20 in places where the species does not winter.

Breeding. In writing of this species, Knight (1908b: 348–349) stated: "The nest is placed on the ground in a slight hollow at the foot of a tussock of grass in a field or pasture or at the foot of a small bush along the line between two fields. Both birds assist in building the

nest, using such materials as dead grass, sedges and fine weed stems which are woven together. The nest is generally arched or roofed over and often approached by an arched passage or tunnel through the grass." Norton found a nest on May 19, 1894, at Westbrook, Cumberland County, that was built in a natural depression which had been enlarged slightly. It was poorly concealed in the young grass, and was built of straw and lined with needles of white pine (*Pinus strobus*), one of these trees being some 30 yards away. The five eggs in the nest provide the earliest egg date at hand. Other records are for four clutches of five and one of six eggs, the latest date being June 12, 1909, for a set of five, recorded by Mrs. F. Eckstorm (1909: 431), at Brewer, although a single egg was found on July 22, 1904, by Johnson (*in* Knight, 1908b: 347), at Pittsfield, Somerset County.

On June 16, 1940, Norton saw a nest with five small young at Berwick, York County. Outside of Maine, the incubation period has been reported by Burns (1915: 285) as 15 to 17 days, and other observers have reported the fledging period as about 12. The young rapidly outgrow the roofed-over nest and, before they are fledged, push it open at the top. There is no evidence at hand of more than one brood being raised yearly in Maine.

Winter. The published and unpublished reports of wintering birds are too numerous to cite individually. Perhaps the earliest record is for January 23, 1886, when one of these birds was shot and others seen at Bar Harbor, Hancock County, as mentioned in Smith's journal. Since about 1904, the species has been noted regularly, often in small flocks, in coastal Cumberland and York Counties. It also has wintered in the other counties as follows: Androscoggin, in the Lewiston-Auburn area in 1938–39 (Mrs. C. Norton); Kennebec, at Manchester, to January 14, 1917 (E. Pope); Sagadahoc, at Bath in 1922–23 (Spinney); Penobscot, at Orono on February 4, 1939 (R. Beaton), and at Brewer where several were present to March 12 and 13, of the same year, when a severe storm occurred (Weston); Hancock, as noted above; and in Washington, at Calais where one was found frozen in January, 1899 (Boardman, 1899b), at Lubec in the winters of 1911–12 and 1920–21 (Clark, 1921), and near Machias, one was found dead in January, 1921 (Kilburn, 1922b: 117), the species was seen until December 25, 1922 (Kilburn, 1923: 38), and into February, 1925 (E. Holway).

Ecology. The Meadowlark shows a marked preference for hayfields, especially those where the grass was not cut the previous year, in the breeding season. The old matted grass is used for the nest, the short runway to the nest being under this mat. Beginning about mid-July, post-breeding flocks wonder about a great deal from one stubble field

to another where the food they gather is probably more vegetal than animal. Wintering individuals and flocks feed about barns, in places where weeds stick up through the snow, in salt marshes, and in roads.

Remarks. In the 1860's and 1870's, this species was somewhat rare and local, being seen chiefly in migration. In the journals of A. G. Rogers and Everett Smith, very few birds are recorded as shot in Cumberland County in the sixties, and these for the months of August and September. N. C. Brown (1882f: 16) considered the species a rare summer resident, being seen most often in migration in the Portland region. For adjacent Westbrook, Norton (1909b) reported that none was seen for several seasons prior to 1891 when he saw one, but after this date there was a steady increase and some even wintered nearby at Scarborough in 1908–09. Eastward, at Seguin, on April 3, 1902, Spinney wrote in his journal: "Have seen a number the past two or three years, whereas before I saw but one on the mainland since I have been observing birds."

The increase in numbers was accompanied by an extension of the breeding range. Data for the present northern limits of the range reveal that by 1901, the species had occurred in Farmington in southern Franklin County, and was known from Athens, Pittsfield, and Fairfield Center in southern Somerset (Swain, 1901e: 37). To the east in southern Penobscot County, Knight (1908b: 348) reported knowing of only three pairs within a 40-mile radius of Bangor, but Mrs. Eckstorm (1909: 431) stated that there had been Meadowlarks in the region for many years, and reported them from several localities in Brewer. They now are fairly common in that part of the county.

Writing of this species in 1926, Norton (1926c: 465) stated that the past 35-year increase had been such that they then outnumbered Bobolinks in many sections of southwestern Maine. The increase has continued, at a slower rate, to the present, but there appears to have been little comparable extension of range, except perhaps at the eastern limits where the bird seems to be increasing slightly in the western section of coastal Hancock County. Farther east along the coast, it is rare, only one specimen having been reported by Boardman (1862: 127) for eastern Washington County or adjacent New Brunswick, and the species was listed by him, several decades later (1903: 305), as "Very rare; only accidental." The bird has not been reported from northern Piscataquis County or the upper third of Penobscot. Whereas it is true that in these two sections there is little or no suitable habitat for the Meadowlark, in Aroostook County where there is considerable country of fairly suitable type, the bird has been known to occur only on May 18, 1922, near Caribou (Kilburn, 1923: 36), and one on May 1, 1940, and two on June 2, 1941, at Presque Isle (Chamberlain).

An early record of interest is the capture of a male at Rangeley, Franklin County, on April 21, 1897 (Brewster, 1901), at a time when these birds were still comparatively uncommon and at a place somewhat north of the present range.

Audubon's statement (1834: 218) that Meadowlarks "proceed in autumn from the northern parts of Maine," seems too indefinite to constitute a record for that part of the state.

Yellow-headed Blackbird

Xanthocephalus xanthocephalus (Bonaparte)

Three records. A young female was shot by Fred Rackliff on August 17, 1882, on Metinic Island, Knox County, and the mounted specimen sent to Ridgway for identification (Norton, 1893). An adult female was found on September 11, 1925, on offshore Monhegan (Taylor, 1926: 241). A bird of unstated sex was seen in August, 1934, at Harpswell, Cumberland County (C. Williams).

Remarks. A wrong date of capture for the Metinic specimen was reported by Ridgway (1887).

Eastern Red-winged Blackbird

Agelaius phoeniceus phoeniceus (Linnaeus)

Summer resident, common to numerous (except perhaps absent from some areas of extensive forest inland) throughout, including many larger islands; *transient,* numerous in spring and fall throughout.

Spring. Migration begins about March 12, with the peak from March 21 to early April. Early dates are for unstated number on March 8, 1946, at Lewiston, Androscoggin County (C. Siemon), three at the same place on March 9, 1921 (Miss C. Miller), and six on March 10, 1946, at Hampden, Penobscot County (Mrs. P. Hannemann). Sometimes the species is not seen in the Bangor region until the second week in April. It reaches Presque Isle from March 23 to April 12 (Chamberlain). Earliest arrivals in the state are adult males, with the young ones and females coming later, and migrants continue to arrive until early May in some years.

Fall. Most birds depart in September, but occasional flocks are seen throughout October. The latest record for well inland is for a large flock seen on October 14, 1937, at Jackman, Somerset County, by A. R. Phillips. November records are: three seen on the 9th in 1941, at Cape Elizabeth (W. Taber); one seen on the 12th in 1945, at Petit Manan

Point, Washington County (Weston); a male on the 13th in 1901, at Seguin (Spinney); and one seen the week of the 14th in 1939, on offshore Monhegan (Mrs. J. A. Townsend).

Breeding. Of this species, Knight (1908b: 345–346) wrote: "The nests are well woven from sedges, rushes and grass leaves, lined with finer sedges and grasses, being woven into and supported by the stems of cattails, rushes, sedges and bushes over the water or near the water's edge. . . Three to six, more often four or five eggs are laid from as early as June first to as late as the first of July, usually early in June." All data at hand indicate that, for the greater part, laying occurs during the first ten days of June throughout most of the state, although somewhat earlier in York and Cumberland Counties. The earliest record is for three eggs (probably incomplete clutch) found on May 25, 1938, on Great Chebeague Island in Casco Bay (Norton), but the same observer also found young several days old as early as June 2, 1936, near Portland. Egg dates later than June 19 are for four fresh on June 22, 1938, in Somerset County (Eckstorm), and four on June 31, 1900, at Pittsfield in the same county (Knight, 1908b: 345–346).

Outside of Maine, incubation has been reported variably as ten to 15 days, but probably there is variation, with 11 days being about average. Knight (ibid. 346) gave incubation as 14 days, and fledging as about 16. One brood is raised yearly.

Ecology. Male birds often arrive in small flocks when there is still much snow on the ground. For example, two males were seen on April 27, 1940, at Greenville, Piscataquis County, when two feet of snow was present (Eckstorm). During the period of melting snows and breaking up of the ice, Red-wings are seen in trees and bushes in flooded places, but several weeks have yet to pass before the ground is bare, the waters down to near summer level, and the vegetation on future nesting sites exposed and growing. Then the females arrive and nesting territories are chosen. The nests often are lopsided before the young are half grown, due to differences in growth rates of different stalks or stems to which the nest is attached. At the end of the breeding season in July, the birds gather in flocks and, instead of Grackles as associates, as in spring, Rusty Blackbirds or a few Cowbirds join them. Many of the wandering or migrating flocks spend some time about pond-holes in salt marshes, for food is abundant there, also plenty of 'thatch' in which to roost at night.

Remarks. On May 14, 1933, at Sabattus Pond in Androscoggin County, Red-wings were seen "catching insects on the wing, after the manner of Flycatchers, or on the ground, like Bluebirds" (Norton).

The first Maine record for this species is Champlain's (1878: 68) for July 12, 1605, on the marshes in the vicinity of what is now Wells,

York County. Josselyn (1674; 1865b: 79) reported that "*Starlings* black as *Ravens* with scarlet pinions" were found at Scarborough, Cumberland County, where he dwelt first in 1638 to 1639.

Orchard Oriole

Icterus spurius (Linnaeus)

Four records, for York, Androscoggin, Lincoln and Knox Counties. There are a number of questionable reports of occurrence, including some of breeding.

Records. These are listed chronologically by year, and are as follows: one taken at Thomaston, Knox County, by C. A. Creighton (Smith *in* Knight, 1897d: 88), the year being 1883, as shown in a notebook of Smith's; one taken near Auburn, Androscoggin County, on unrecorded date (Pike *in* Knight, ibid.); a male in first breeding plumage seen on June 17, 1936, on Appledore Island in the Isles of Shoals (P. L. Wright, 1937a: 41); and one seen on July 1, 1947, at Muscongus, in Bremen, Lincoln County (J. Cadbury).

Remarks. As long ago as 1808, Wilson (1808: 72) said that the range of this bird extended "as far as the province of Maine." Audubon (1831: 224) stated that he had "met with it as far as the province of Maine." DeKay (1844: 140) cited Audubon. Quite naturally, the species subsequently was included in the nominal Maine lists of Holmes (1861a: 117) and Hitchcock (1862: 69), and A. E. Verrill (1862b: 156) stated that it was "not common" in southern Maine in summer. Smith's statement (1882–83: 484) of "only rare occurrence in Southwestern Maine" undoubtedly was based on Verrill. It seems likely that all of these statements owe their origin, directly or otherwise, to the rather indefinite report by Wilson.

A male, taken in the Calais region prior to 1862, was the basis for the statement by Boardman (1862: 127) that this bird was a rare summer resident, and of the report by him in Knight (1897d: 88), but this record is one of those for which the locality, Maine or adjacent New Brunswick, is questionable.

For the Lewiston-Auburn region, C. E. Miller (1918: 59) wrote: "There have been several reports of the Orchard Oriole and once I thought I saw a two-year-old male. I have not been able to get sufficient proof of its identity to include it in my catalogue." There have been a number of uncomfirmed reports from that region since she wrote, in addition to those she furnished Forbush, which are cited below.

According to Forbush (1927: 439–440), a young male was seen, by Mrs. F. M. Ray, on May 21, 1922, at Westbrook, Cumberland

County, and a pair bred in 1924, a nest being found by C. Farrar, and in 1926, at Lewiston, as reported to him by C. E. Miller. Norton doubted these and any reports of breeding, of which he received several.

Observers should be careful to distinguish Orchard Orioles from young Baltimore Orioles.

Baltimore Oriole

Icterus galbula (Linnaeus)

Summer resident, fairly common in coastal counties to Penobscot Bay and north to include the southern parts of Oxford, Franklin, Somerset, Penobscot, and perhaps extreme southern Piscataquis, uncommon but regular in a few settled areas east of the Penobscot drainage, and of rare occurrence (not known to breed) on a few larger islands; two *winter* records.

Spring. This bird generally arrives in Cumberland County from May 6 to 9 (occasionally on May 5), and in Franklin and Penobscot Counties from May 9 to 12. Early records are: April 17, 1922, at Brunswick, Cumberland County (Walch, 1926: 59); April 22, 1897, at New Vineyard, Franklin County (McLain *in* Powers, 1897g); and May 4, 1878, at Portland (Smith). It also has been seen as early as May 5, 1914, at Norway, Oxford County (Cummings *in* Rogers, 1914: 274), and May 5, 1944, at Hampden, Penobscot County (Mrs. P. Hannemann). Migration in Cumberland County reaches a peak during the third week in May, and apparently is completed before the end of the month.

Fall. Migration occurs in August, the species being scarce during the last ten days of that month. Later records are: four on September 7, 1918, and one the next day, on Monhegan (Dewis, 1919: 39), one on September 16, 1897, at Seguin (Spinney); a female seen on October 14, 1934, at Bar Harbor, Mt. Desert Island (Mrs. E. A. Anthony); one on October 21, 1946, at West Waldoboro, Lincoln County (F. Burrill); and one trapped and banded on November 28, 1942, at Lewiston, Androscoggin County (R. Smolker).

Breeding. Knight (1908b: 352–353) wrote: "The usual site selected is an inaccessible one at the ends of the outermost branches. Here the pensile nest is attached to several slender branches. Many nests are composed entirely of horsehair, closely and nicely interwoven, others contain much twine, soft silken plant fibers, and even pieces of cloth and newspaper. Hair, tow, waste, and various similar material is used to line the bottom of the nest . . . Nests in elms vary in elevation from the ground from about twenty to fifty feet. Nest building requires

about fifteen days, the male being present and closely inspecting the work as it goes on and occasionally contributing a little material." The same tree may be occupied for a series of years, a new nest being built annually. "The eggs are laid one each day until the complement of three to seven, usually four or five are laid" (ibid. 353). Specific dates are: five eggs, slightly incubated, taken by Eckstorm on June 3, 1912, at Brewer; and five fresh on June 5, 1887, and young just out of the nest on June 21, 1918, near Portland (Norton). "Incubation lasts about fifteen days, the female sitting very closely and rarely leaving the nest, being tended and fed frequently by her mate. The young leave the nest in about fifteen to eighteen days" (ibid.). A single brood is raised yearly.

Winter. One was killed on February 25, 1886, at Old Town, Penobscot County, and sent to E. S. Bowler, a Bangor taxidermist (Smith). On December, 26, 1941, Walter Rich first noted a male about his house in Falmouth, Cumberland County. It remained in the vicinity, and on January 5, 1942, Rich trapped the bird and kept it indoors, where it seemed to be doing well until the night of January 12 when it died. It was thin, but on dissection was found to have no injuries.

Ecology. "The nests are usually placed at the ends of the long drooping branches of the elms which line the village streets and country highways, but occasionally nests are placed in maples, locust, cottonwood, poplar or other hardwood trees and even in apple and pear trees in orchards" (Knight, 1908b: 352). This, in fact, defines the bird's habitat, and reveals why it is found mainly about human habitations or in river valleys in the state.

Remarks. As early as 1862, the species was reported as common at Norway, Oxford County, by A. E. Verrill (1862: 151), and it appears to have been common in summer in southern Maine east to about Rockland, Knox County. Knight (1908b: 352) reported that it "was gradually extending its range northward with the progress of civilization in Maine. Mr. Manly Hardy informs me that the species was not observed near Bangor until about 1860, though known in the Kennebec Valley many years previously. It is at the present writing known to occur at least north to Lincoln [Penobscot County]." Hardy's journal contains the following note: "May 28, 1868. Brewer, Me. Saw a pair of Golden Robins or Baltimore Orioles. First I ever saw in Maine . . . I have lived here 33 years and have never seen one [before]."

In Piscataquis County, it has occurred north at least to the Katahdin region, as reported by Palmer and Taber (1946: 311). Chamberlain, who saw the species at Presque Isle on May 18, June 21, and a week later, in 1942, writes: "Reports have frequently come in of this species in Aroostook County, but these are the first actual observations that we have made."

On the coast, occurrence diminishes rapidly east of Penobscot Bay. Tyson and Bond (1941: 71) considered it a rare summer visitant on Mt. Desert Island. From subsequent records, the species may be increasing slightly in numbers in that region. "It is locally common in Washington County in the larger towns; several pairs nest regularly in Calais" (Mendall).

Among foods eaten by this bird, as listed by Knight (1908b: 353), are tent caterpillars and larvae of the Colorado potato beetle.

Bullock's Oriole

Icterus bullockii subsp.

One specimen, formerly in the Manly Hardy collection, was collected about the middle of November, 1889, at Sorrento, Hancock County.

Remarks. This specimen first was recorded by Brewster (1890), who, quoting Hardy, stated that it came from the vicinity of Bangor. The correct locality was given by Knight (1897d: 88). Tyson and Bond (1941: 71) gave the date of capture as about November 5, which probably is a misprint for the 15th.

In 1913, the Hardy collection was transferred to the Roger Williams Park Museum, in Providence, Rhode Island, where, according to Mrs. Eckstorm, it deteriorated from lack of care.

Rusty Blackbird

Euphagus carolinus (Müller)

Summer resident, fairly common in most of Oxford, Franklin, and Somerset, all of Piscataquis, all except southwestern Penobscot, all of Aroostook, northern Hancock, and most of Washington County; *transient,* very common in spring and fall throughout; two *winter* records.

Spring. This species usually arrives about March 20 in Cumberland County, and has been reported at widely separated points within a few days of this date. Thus, whereas early occurrences in Cumberland County are March 19, 1902, at Westbrook (Norton), and the same date in 1922 at Brunswick (Walch, 1926: 59), it also has been seen as early as the 23rd at Presque Isle (Chamberlain). There usually is a good flight of these birds in Cumberland County about March 31. The latest spring occurrence for migrants outside the breeding range is for two seen by Spinney on May 3, 1900, at Seguin.

Fall. Although there is a great deal of wandering in August, migration occurs chiefly in September and the first ten days of October.

A few birds have been seen as late as October 29, and Norton saw a single individual on November 5, 1939, near Portland, with a flock of Starlings and Grackles.

Breeding. The well concealed nest typically is placed in a small evergreen tree not far from water, and not more than ten feet from the ground. Variations include sites in hardwood bushes, one on top of a stump standing in water, and one only a foot above water in a stranded spruce. Some nests have been found a considerable distance from water. The nest, well built and rather bulky, usually has a foundation of *Usnea*, a framework of twigs, *Usnea*, and lichens and grasses, with the hollow lined with rotting vegetation (which is very hard when dried), and an inner lining of fine green grasses. (Summarized from Kennard, 1920, with additions.)

Data on ten sets of eggs show the number to range from three to five (usually the latter), and dates for clutches from May 10, 1931, for five fresh eggs taken by Eckstorm by Kokadjo, Piscataquis County, to June 19, 1900, for three in Penobscot County, reported by Kennard (1920: 418). Later eggs are indicated by Kennard's reports (ibid. 415, 421–422) of three young, only a few hours old, on July 14, 1917, in Penobscot County, and of adults feeding fledgings on July 20, 1918, in Washington County. Incubation, by the female, is reported, outside of Maine, as 14 days (Bendire, 1895: 492). Judging from Kennard (1920: 421), fledging requires about 13 days, and, he stated, "Whether or not Rusty Blackbirds may occasionally raise a second brood, I am unable to say."

Winter. A small flock was "about town nearly all winter," 1898–99, at Calais (Boardman, 1899b). On January 26, 1919, a single individual was seen with a flock of Crows at Falmouth, Cumberland County (Rich).

Ecology. In early spring small flocks are seen, usually in trees about marshy places. One often sees, at this season, mixed flocks containing Red-wings, Cowbirds, or Grackles. Later, when territories are established, seldom are more than two or three pairs found about the outlet of a sluggish stream, or around the edges of a fairly large stretch of open bog which has some standing water in it—both of these haunts being much favored in May and June by this species. In July the family groups and larger gatherings move to more open situations. When canoeing, I often have seen them on flats and sandbars at this time of year. Brewster (1937: 518) pointed out that, in the first half of October, he had seen them congregating "by hundreds" on mudflats about Lake Umbagog. Usually a few Red-wings or Grackles are seen with these fall flocks.

Remarks. The population of this species appears not to have changed in the past 40 years at least.

Boat-tailed Grackle

Cassidix mexicanus subsp.

One sight record. "I observed a pair of grackles of this species at Second Lake, Washington County, Maine, August 1, 1877. Their appearance so far north and east astonished me, and I might well have doubted my senses at first, but I spent nearly a half day in the proximity of these birds, with the best possible opportunity for close observation, and with my familiar knowledge of the species and of their characteristic notes and habits, identification was rendered certain. . . When first approached a great outcry was made, such as is unrivalled by any other grackle" (Smith, 1882–83: 485).

Remarks. Smith, who had spent four months in Texas localities where this species was plentiful, undoubtedly knew whereof he wrote, yet his report was criticized by Brewster (1883d: 165), and doubted by both Knight (1897d: 139; 1908b: 651) and G. M. Allen (1909: 227).

Bronzed Grackle

Quiscalus quiscula versicolor Vieillot

Summer resident, rather common throughout, except uncommon and not known to breed on islands east of Casco Bay; *transient,* numerous in spring and fall throughout, including islands; *winter resident,* uncommon, chiefly coastwise from Hancock County westward.

Spring. Although large flocks sometimes are seen as early as March 10 in southwestern counties, the majority of birds, including flocks sometimes containing several thousand individuals, are seen from March 19 to April 7. Migration is practically over by April 25, although small flocks have been seen as late as May 16. Flocks of less than 50 birds have been seen as early as March 10 in southern Penobscot County, March 15 in Hancock, and March 19 in Aroostook, according to various observers.

Fall. Migration begins by the last week in September, but occurs chiefly throughout October and to November 14, with very small numbers reported to the end of the month in places where the species is not known to remain all winter. The peak of the autumn flight occurs from about October 14 to 26 throughout the state.

Breeding. Knight (1908b: 357) stated that this species, generally nesting in scattered colonies, places its nest in a wide variety of situations, such as in the thick branches of spruce, fir or pine, from fifteen to thirty feet, in elms and maples at forty to fifty feet, in hollow trees or old Flicker holes, the top of a broken off stub, in low willow

and alder bushes in thickets, and on the ground as well; nests are large bulky masses of "coarse grasses and sedges, weed stems and similar material, cupped often with mud and lined with grass or a little hair." Brewster (1876b: 66–67) reported nesting in tree cavities and in large woodpecker holes at Lake Umbagog; this may have been the basis of Knight's mentioning such sites. According to Knight (1908b: 358), building requires from six days to two weeks, both birds building, after which an egg per day is laid until the clutch of three to seven (usually five) is completed.

Records of 11 sets are for four of four eggs, six of five, and one of six. The earliest date for eggs known to be fresh is for a set of five on May 12, 1911, at Brewer, and the latest for four on June 22, 1938, in Somerset County, both taken by Eckstorm. "On May 23, 1947, at Pembroke, Washington County, I found three nests, two with five and one with six eggs. They were within 25 yards of each other in an open marsh. They averaged about two feet above the water and were all in clumps of *Myrica gale*—in typical Red-winged Blackbird fashion" (Mendall). Knight (ibid.) stated that incubation, by both birds, begins before the clutch is completed and requires 13 to 16 days. Outside of Maine, it has been reported as 14 days, and by the female. Both parents feed the young. The fledging period apparently is unrecorded. One brood is raised yearly.

Winter. Grackles have been noted during at least ten different winters beginning in 1884. Usually one or two birds are seen, but occasionally a small flock is reported, the latter generally about Portland. Although most records are for coastal areas and on islands, there are a few inland ones, the farthest in being for a bird that spent the winter of 1921–22 at Fort Fairfield, Aroostook County, as reported by Kilburn (1923: 36). One, taken near Bangor, was brought to a taxidermist there in the second week in January, 1884 (Hardy), and one was seen east of there in Eddington, Penobscot County, in February, 1946 (Weston).

The coastal records begin with Hancock County, where one wintered in 1938–39 on Mt. Desert Island (Mrs. E. A. Anthony), and one was seen in February, 1941, at Orland, and another on February 14, 1942, at Bucksport, both by Weston. One was seen for about a week before January 24, 1884, on Vinalhaven, Knox County (Medicus II, 1884). The species has been noted at points westward to Portland where there are more records for this season than for any other single locality. Three wintered in 1939–40 on offshore Monhegan (Mrs. J. A. Townsend).

Ecology. In the spring, flocks arrive before the ice is out of ponds and streams, or snow is off the ground. They perch in open hardwood

trees, or feed on the ground, birds at the rear of the straggling flock continually taking wing and flying over the heads of their companions to alight at the head of the flock and briefly form the vanguard. The social habit is maintained on a reduced scale throughout the summer, as the species tends to nest in small, rather loose, colonies. The preferred nesting habitat is in deciduous or mixed woods near water. After cleaning the nest, and if water is nearby, the parent bird almost invariably will fly over it and drop the fecal matter there. This adaptable species now nests in many of our cities and villages, but is found also in many remote wild places far from human habitations.

The fall flocks rarely are as large as those seen in spring. They migrate by day, passing over quite high in the air, and often in company with flocks of Crows and Rusty Blackbirds. Some wintering birds seem to be strictly dependent on man for food, living on scraps and garbage, while others get at least part of their livelihood from the salt water flats between the tides.

Remarks. This bird has increased in numbers markedly during the past 60 years, the increase continuing to the present, but at a slower rate than in the period from about 1910 to 1928, as shown by numerous data. For the Portland region in 1882, N. C. Brown (1882f: 16) considered this species as rare in summer and uncommon in migration; in 1917, he reported (1917a) a great increase; and in 1923 a still greater one (1924). At certain other localities, however, it had been reported as common and breeding even before publication of Brown's first report, as for example: at Norway, Oxford County, by A. E. Verrill (1862a: 151); in the Calais region by Boardman (1862: 127); and for the Bangor-Brewer region, Hardy (1881) wrote that the status had changed from "almost unknown" to very numerous in about 30 years. Batchelder (1882: 149) reported the species as common in 1879 at Fort Fairfield and very common at Houlton, both in Aroostook County.

This species is said to have first nested at Jonesport, Washington County, as recently as about 1926 (E. B. Sawyer), whereas northward in the Calais region, it long has been reported as very abundant, by Boardman (1903: 305), and Mendall (*in litt.*, 1948) stated that it is locally common in the county. As recently as 1945, it was reported as only casual in summer on Mt. Desert Island (Bond), but it long has been known as a common breeder inland to the northward. From this and the above, it is apparent that the species established itself in the interior of the state before occupying much of the coast 'down east.'

The chief complaint against this species in Maine is that it eats many eggs and young of other birds, and not so much that it sometimes does damage to garden crops.

Eastern Cowbird

Molothrus ater ater (Boddaert)

Summer resident, very common in western counties, but decreasing to fairly common in northern and eastern counties (absent from areas of unbroken forest) and uncommon on larger islands; *transient,* very common in spring and numerous in fall throughout; several *winter* records.

Spring. This species arrives in southwestern counties from March 18 to 30, with most birds seen during the first 20 days in April. Six were seen as early as March 19, 1946, by Mrs. P. Hannemann, at Hampden, Penobscot County, and two males were seen on March 25, 1939, as far east as Isle au Haut, by Norton. It arrives from April 10 to 20 at Presque Isle (Chamberlain).

Fall. Migration occurs throughout September and October, with a few records to as late as November 9, and a single bird seen by Norton on December 1, 1909, at Portland.

Breeding. "The female builds no nest of her own but lays her eggs in the nests of other birds . . . Some birds desert their nests on finding such unwelcome addition, while others hatch and bring up the interloper. Usually only one, but sometimes even two, three or four Cowbirds' eggs are found in the nests of smaller birds" (Knight, 1908b: 342). Records at hand for eggs range from May 25 to July 13, the two latest dates being for a fresh egg on July 12, 1936, and a well incubated one found the next day, by Mendall, in Black-throated Green Warbler nests at South Thomaston, Knox County. Although Knight (ibid.) stated that the incubation period was ten days, it probably is nearer the 11 to 13 (average 11.6) reported by R. T. Norris (1947: 102) in Pennsylvania. Knight (1908b: 343) gave the fledging as about ten days, but Norris (op. cit.) found that the age on leaving the nest was eight to ten (average 8.7).

Knight (op. cit.) was correct in stating that the female Cowbird sometimes removes an egg of the host, but that the young Cowbird may throw out the eggs of the host before they hatch is unsubstantiated. The size of the host, as recorded in Maine, ranges from the Veery, as reported by Knight (1908b: 342), to the Ruby-crowned Kinglet, a male of the latter species having been observed feeding a young Cowbird on July 22, 1941, at Scarborough, as reported by Holt (1942).

Winter. On December 25, 1917, one of these birds was seen with English Sparrows in Portland (Norton). One was seen on December 27, 1905, at Damariscotta, Lincoln County (David *in* Noble, 1906: 28). The species was reported from "as far north as Rockland," Knox

County, in the period from December 15, 1931 to February 15, 1932, according to May (1932a: 135–136). On February 6, 1942, J. C. Parlin wrote Norton that four Cowbirds were coming to a feeding station at Canton, Oxford County. On December 1, 1944, a male and female appeared at a feeding station at Presque Isle, remaining until February 15, 1945, being trapped and banded, and on March 31, a banded male, presumably the same one, was seen there (Chamberlain). An unstated number remained from December 15, 1947, to at least the end of January, 1948, at West Waldoboro, Lincoln County (Mrs. L. F. Bidwell).

Ecology. This species is an inhabitant of open country, especially where the grass is short, such as in pastures and cultivated fields. It feeds on the ground on both animal and vegetable matter, and on insects on the backs of livestock. It is social and gregarious, small groups being seen in flocks of Grackles, Rusty Blackbirds, Red-wings, Starlings, and English Sparrows. The Starling is the most common associate in August.

Remarks. This species has been increasing in Maine for many years. A. E. Verrill (1862a: 151) said it was common and bred at Norway, Oxford County. Considerably later, N. C. Brown (1882f: 16) considered it rather common at Portland, where it now is common in summer and very common in migration. Contemporary with Verrill's report was that of Boardman (1862: 127), who wrote, for Calais, "Not common; Breeds," and several decades later (1903: 305) reported it as rare. It has increased considerably since in 'down east' Maine, but is not present in such numbers as farther westward. As to our most northern county, Knight (1908b: 341) wrote: "summer resident, seemingly not common but found even in the Woolastook [=St. John] valley." Fifteen years later, Kilburn (1923: 36) wrote: "The Cowbird arrives about April 10th along the Aroostook river. For about a week they are common, then all disappear. I have no record of any at any other time of the year. Where do they go? Of the hundreds of nests of various species examined during years of residence in Aroostook, I have never found the egg of the Cowbird." At present, according to Chamberlain, it is a common migrant but less common summer resident there.

Flocks of 200 to 300 birds are not unusual in August in York and Cumberland Counties.

Swain's report (1899a) of a pair of Cowbirds building a nest (but no eggs laid in it) certainly is remarkable, if true.

Family THRAUPIDAE

Western Tanager

Piranga ludoviciana (Wilson)

One specimen was taken about October 1, 1889, near Bangor, and sent to a taxidermist there to be mounted; it was an adult male, seen in the flesh by Hardy, who identified it by comparing it with specimens of the same species in his collection (Knight, 1897d: 104).

Scarlet Tanager

Piranga olivacea (Gmelin)

Summer resident, uncommon though regular in most of western Maine, but perhaps only occasional or even rare in northern and eastern sections; *transient,* uncommon in spring and fall throughout.

Spring. This bird generally arrives in southwestern counties from May 10 to 14, but has occurred earlier beyond this area. An adult male was seen on April 17, 1929, when there was four inches of snow on the ground, and one, presumably the same, was found dead on the 23rd, at Great Head on Mt. Desert Island (Mrs. E. A. Anthony). On April 19 of the same year, an adult male was found dead at Yarmouth, Cumberland County, and was taken to a Portland taxidermist in whose shop Norton saw it. In the *Portland Advertiser* for May 18, 1852, Sylvester Beckett reported this species occurring at Portland in April, 1852, at the close of a northeasterly storm that "had been blowing eight or ten days incessantly . . . Many of the Tanagers died with the cold soon after their appearance here" (*in* Norton, 1909e: 65–66). The height of this storm was April 18 to 20 (Perley, 1891: 317–320). This species was seen as early as May 9, 1905, at Phillips, Franklin County (Oberholser, 1918a: 16), May 10, 1944, at Orono, Penobscot County (Mendall), and May 12, 1904, at East Hebron, Oxford County (Johnson *in* Sweet, 1905c: 63). It also has been seen as early as May 16 at Presque Isle (Chamberlain), and on May 21, 1913, at Machias, Washington County (W. H. Palmer, 1913). In York and Cumberland Counties, most migrants are seen between May 15 and 21, with migration ending after the 28th.

Fall. Migration takes place mainly during the first three weeks in September. Later dates are: several seen on September 23, 1937, at Jackman, Somerset County (A. R. Phillips); a flock on September 29, 1918, at Winthrop, Kennebec County (E. Pitman); October 5, 1898, at Seguin (Spinney); October 1 and 6, 1918, on Monhegan

(Wentworth *in* Jenney, 1919: 29); a male in winter plumage seen on October 14, 1934, at Great Head on Mt. Desert Island (A. Stupka); and an immature male found dead on December 19, 1937, at Gardiner, Kennebec County, but too decayed for mounting when received by a Bangor taxidermist (Mrs. C. E. Norton).

Flight years. In some years, very few are seen in spring; in others, a few are seen at many points. It was exceptional that the species was reported (Boardman, 1862: 125) common in the spring of *1861* at Calais. In the spring of *1906*, Brownson (1906e: 86) reported the species as much more common than for several years, Knight (1906c) reported many in the lower Penobscot valley, and Cooper (1906) reported that, because of cold weather in May, three were found dead at Milo, Piscataquis County.

Breeding. Although this species has been seen under conditions indicating certain breeding, I find no records of nests. Knight's remarks (1908b: 448) on the subject, like the writer's, are clearly a case of utilizing data from outside the state. The nest is reported to be a large flat structure, loosely built of twigs, strips of bark, grasses, and similar material, lined with rootlets, and situated near the end of a horizontal limb, usually over 20 feet above ground. Incubation is reported as 13 days, by the female (*in* Forbush, 1929: 130). The fledging period apparently is unrecorded. One brood is raised yearly.

Ecology. In summer this bird is found most often in mature deciduous woods, especially in oaks, but not infrequently in fairly large white pines in areas where the deciduous growth is younger or composed of slender trees. One year several birds spent the summer on the Bowdoin College campus, often feeding on the lawns under the maples (Gross). About 1927, two males "wandered about back yards at Presque Isle for several days. They showed little fear of man and preferred running like chickens to flying" (Chamberlain). In migration they occur almost anywhere that there are trees, except in large stands of conifers. Fall migrants at Seguin and Monhegan have been mentioned above. They have been noted at the former place in spring also (Spinney), and, according to J. A. Allen (1880: 132), in the spring of 1879, one or more struck Egg Rock Light, near Bar Harbor, at the entrance of Frenchmans Bay.

Remarks. Before the settlement of the state, this species probably was confined to the hardwoods in southwestern counties and to river valleys, unless the tendency to frequent white pines was even more marked than at present. The species has been reported from nearly every section of the state, and records for the past 40 years indicate, I believe, an increase in birds rather than merely better reporting of those present.

A resident of Scarborough in 1638 to 1639, and 1663 to 1671, Josselyn (1674; 1865b: 79) wrote that a bird occurring there was the "golden or yellow hammer, a Bird about the bigness of a *Thrush* that is all over as red as bloud." This would seem to refer to a tanager rather than to an oriole.

Eastern Summer Tanager

Piranga rubra rubra (Linnaeus)

Rare *visitant* (April 17 to October 21), recorded from Cumberland, Lincoln, and Penobscot Counties, the ten birds seen or collected occurring mostly in spring.

Records. These are listed chronologically by year, and are as follows: the species noted in April, 1852, in Portland after a long northeasterly storm (Beckett *in* Norton, 1909e: 65–66); one obtained at Wiscassett, Lincoln County, some years prior to 1883 (Smith, 1882–83: 465), the identification of the mounted specimen being confirmed by William Brewster (Knight, 1908b: 448); a female shot on May 17, 1913, at Holden, Penobscot County, by Eckstorm (Forbush, 1929: 134), and now in the University of Maine collection; a moulting male on October 20, 1918, and a female the next day, on Monhegan (Wentworth *in* Jenney, 1919: 29); an adult male seen on May 13, 1920, and collected the next day, at Scarborough (Norton); a male seen on May 18, 1928, in an orchard near Gorham, Cumberland County (J. Keene); a male, found dead in the vicinity, brought into a Portland taxidermist's shop on June 6, 1928 (Norton); a male seen on April 17, 1929, and found dead the next day, on Winslow Street in Portland, and presented to the Portland Society of Natural History (Norton); and an immature male, in the collection of the Boston Society of Natural History, found dead on May 14, 1945, at South Gorham, and identified by Ludlow Griscom.

Remarks. In connection with the Portland record of April, 1929, it is interesting to note that four specimens were found dead the last ten days of the same month of the same year in southern Massachusetts, as reported by W. S. Brooks (1929).

In a compilation of migration data, Brownson (1906d: 68) included his own report of occurrence on May 18, 1905, in the Portland region. Norton later made a note that he doubted this report. Forbush (1929: 134) cited the report, erroneously crediting it to Norton.

Boardman (1903: 303) reported that he had taken two specimens at Grand Manan, New Brunswick.

Family FRINGILLIDAE

Eastern Cardinal

Richmondena cardinalis cardinalis (Linnaeus)

Probably a very rare *visitant,* most records referring to escaped captives.

Records. These are listed chronologically by year. This species, with other southern birds, appeared in Portland in April, 1852, after a prolonged northeasterly storm (Beckett *in* Norton, 1909e: 65–66), that, according to Perley (1891: 317–320) reached its height from April 18 to 20, and did great damage from Virginia to Maine. "Birds of this species have been observed at various times, but they may have been escaped cage birds" (Smith, 1882–83: 466). Knight (1897d: 102–103) recorded a female taken from a flock of three at Gardiner, Kennebec County, although not till later (1898d) did he give the date of capture, December 19, 1895. Ives (1899) stated that "several years ago, after the first snowfall at Stroudwater," a suburb of Portland, a male appeared that was caught and kept caged until the following spring when it was released; presumably the same one appeared the following fall and was again caged, and subsequently died.

One was seen on June 11 and 12, 1909, in Portland by Mrs. F. M. Ray. On April 18, 1929, one was seen in South Portland (E. Pitman). A female came to a feeding station all through the winter of 1945–46, at Sabattus, Androscoggin County, and left in late April (Mrs. C. C. Holden).

Rose-breasted Grosbeak

Pheucticus ludovicianus (Linnaeus)

Summer resident, uncommon though regular in western and central counties, decreasing to rather rare in extreme northern Maine, along the coast east of Sagadahoc County, and on the few islands where it occurs; *transient,* uncommon in spring and fall throughout.

Spring. Although the average arrival date may be about May 10, this species has been seen at widely separated points during the first ten days in May. Early dates are: April 24, 1909, at Bowdoinham, Sagadahoc County (Robinson *in* Legge, 1910a: 38); April 26, 1905, at Hebron, Oxford County (Johnson *in* Sweet, 1906b: 38); and occurrence in April, 1852, after a prolonged northeasterly storm, at Portland (Beckett *in* Norton, 1909e: 65). Early May dates are the 4th, in 1902 at Lewiston, Androscoggin County (Johnson *in* Sweet, 1904c: 79), and

in 1933, and also the 10th and 12th, 1937, at Great Head on Mt. Desert Island (Mrs. E. A. Anthony), May 6, 1945, at Hampden, Penobscot County (C. Patterson), and May 12 of unstated year at Presque Isle (Chamberlain). Usually the largest numbers are seen in western counties from May 14 to 19. Females have been reported from May 14th on. The latest record for a migrant is May 31, 1901, by Spinney at Seguin.

Fall. Available data indicate that migration extends from about August 15 to September 14, the peak occurring the last week in August. Late dates are: a bird caught on September 24, 1898, on Seguin (Spinney, 1903b: 56); and three males seen on October 2, 1946, at Waldoboro, Lincoln County (J. Keene).

Flight year. In the spring of *1906*, many were seen in the lower Penobscot valley (Knight, 1906c). (See Remarks for smaller concentrations.)

Breeding. The nests are usually in deciduous saplings or bushes, and placed from five to 20 feet from the ground. On an unstated day in June, 1893, Swain (1896a) found six nests in a single morning at Farmington, Franklin County, that were "placed in small maples, the highest being about twelve feet up, while the lowest I could look into by standing on tiptoe. Each nest resembled the others in style and makeup. They contained spruce twigs on the outside with grasses and leaves, and were neatly lined with dark roots and hairs." Each of these nests had four eggs when the clutches were completed. A set of four was seen in a nest on June 2, 1942, at Brewer (Eckstorm). According to Knight (1908b: 442), eggs may be found from June 10 to 30.

H. R. Ivor (1944: 103) studied semi-captive birds in Ontario and found that the incubation period was 12 to 13 days, the nestling period 10, and period of dependence of young about 20 days after leaving the nest. Young out of the nest have been seen as early as June 22, 1914, at Portland (Norton). One brood is raised yearly.

Ecology. In summer this species is partial to sapling hardwoods on hillsides and to dense brushy growth, intermingled with tall rapid-growing succulent plants, in damp places. That these situations represent very transitory stages in plant succession may account, in part, for the instability of this Grosbeak's population in any given area. For example, where Swain found six pairs nesting one year in a 35-acre tract of young growth, he found only a single pair the following year (Swain, 1896a). I usually could find this species without any difficulty in the Bangor Bog, the birds being among saplings and bushes on the areas of high ground in and around the bog. Several pairs sometimes may nest among saplings where hardwood has been cut off in remote areas in the woods.

Remarks. Probably in precolonial times this species was restricted in summer to brushy growth about bogs, along streams, and where saplings were growing in areas burned over by lightning fires. Undoubtedly, lumbering operations and agricultural practices have provided more extensive areas of nesting habitat.

Knight (1908b: 440–441) discussed the distribution of this species, as then known. In summary, it may be said that the bird was found regularly at a number of widely scattered points, but he omitted mention of it near the coast east of the Kennebec River. At the present time, the species breeds regularly on the coast west of the Kennebec, but rarely east of it, although apparently it occurs regularly not far inland in the latter section.

Relatively large numbers have occurred as follows: in the spring of 1897, at Gardiner, Kennebec County (Powers, 1897f); spring of 1903, at Pittsfield, Somerset County (E. B. Morrell, 1903: 40); and summer of 1916, at Manchester, Kennebec County (E. Pope). Boardman (1896) stated that, although this species could not be called common at Calais, he used to collect quite a number in some years.

"The Rose-breasted Grosbeak is the only bird that I have observed feeding on the potato bug" (Mead, 1896).

Eastern Blue Grosbeak

Guiraca caerulea caerulea (Linnaeus)

One specimen, and a number of questionable reports of occurrence. Tyson and Bond (1941: 72) recorded: "A specimen, taken on Mt. Desert Island, now in the collection of Mr. Filliettaz of Bar Harbor." It was collected in May, 1895, and is now in the Acadia National Park Museum (Mrs. E. A. Anthony).

Remarks. In three decades beginning in 1861, this species was accredited to Maine in no less than eight publications, all being traceable to two male specimens, in the Boardman collection, which were taken on Grand Manan, New Brunswick. The correct locality of capture finally was given by Knight (1908b: 652), after correspondence with Boardman.

Forbush (1929: 116) published a list of alleged occurrences, from March 10 to August 24 in the years 1916 to 1926, and with localities in Oxford, Cumberland, Androscoggin, and Penobscot Counties; these included reports of single birds to several pairs seen at a time, two pairs supposedly breeding in 1918 at Fryeburg, Oxford County, and one pair in 1918 and 1919 at West Baldwin, Cumberland County. Reports in the mimeographed *Bulletin of the Maine Audubon Society*

for October, 1945 (vol. 1, no. 4, pp. 97–98) included two seen in May, 1941, at Auburn, and one seen the first week in June, 1945, at Lewiston, both in Androscoggin County.

Although some of these reports may have pertained to Blue Grosbeaks, I feel it is more than likely that most were based on Indigo Buntings. Forbush was an industrious compiler and probably published all the Maine reports of this species that he received, yet when it came to alleged breeding, he was at least skeptical enough to comment (1929: 116) that there was "no fully authenticated breeding record" for New England.

Indigo Bunting

Passerina cyanea (Linnaeus)

Summer resident, uncommon though regular east into Franklin, Kennebec, and Sagadahoc Counties, and apparently also in parts of southern Penobscot, and rare elsewhere, except perhaps absent from almost all marine islands and from most of Aroostook County; *transient* in small numbers in spring and fall.

Spring. This species arrives rarely by May 7, and generally between the 11th and 18th, in western counties. The earliest record, May 6, 1936, is for a bird seen farther eastward at Bar Harbor on Mt. Desert Island, by Mrs. E. A. Anthony.

Fall. Migration extends from late August to October 4, with most migrants seen during the first three weeks in September. Late dates are: a female or immature trapped and banded on October 13, 1939, at Great Head on Mt. Desert Island (Mrs. E. A. Anthony); one, believed to have been a female, seen on October 22, 1939, on Monhegan (Mrs. J. A. Townsend); and a male, banded on October 29, 1938, and present until November 4, at Bar Harbor (Mrs. E. A. Anthony).

Breeding. Knight (1908b: 443) stated that this species placed its nest "in thick bushes in the pastures and clearings, usually not over four to eight feet from the ground." The nest is built of twigs, strips of bark, grass, dried weeds, and a few leaves, and lined with fine grasses and sometimes a few feathers or strands of hair. Eight clutches of eggs from Maine range from two to four (usually three or four) in number. The species is late in nesting and, although some probably nest in late June, as Knight (ibid. 444) suggested, the earliest date at hand is July 3, 1890, for three fresh eggs at Lisbon Center, Androscoggin County, as reported by E. Johnson (1896). The latest egg dates are for July 17, 1898, for three, and July 20, 1889, for two, found by Norton at Westbrook, Cumberland County, but later dates are

indicated by: three partly grown young in a nest on August 2, 1891, at Westbrook (Norton); and three newly hatched young on August 22, 1947, that left the nest on the 29th or 30th, at Topsham, Sagadahoc County (Gross, 1947i).

Outside of Maine, incubation is reported as mostly by the female, and requiring 12 days. In his general account of this species, Forbush (1929: 121) stated that the same nest may be used for successive broods when two are reared in a season, and that sometimes the nest is repaired and reoccupied on successive years. He gave the fledging period as ten to 13 days. It would seem probable that, in Maine, two broods occasionally may be raised in a season.

Ecology. "The species prefers brushy clearings, low second growth thickets and old pastures" (Knight, 1908b: 443). To this should be added rose bushes and tangles of shrubbery about gardens. Sometimes several pairs nest in a fairly extensive area of blackberry bushes and other brush, but they seem to be drawn together by habitat requirement rather than any tendency toward colonial nesting.

Remarks. In the latter part of the last century, this species was common locally in western Maine, to and including Franklin, Kennebec, Androscoggin, and eastern Cumberland Counties. In August, 1898, a fledged brood was seen at Caribou, Aroostook County (G. M. Allen, 1901: 11–12). For 'down east,' Boardman (1903: 305) wrote: "Not uncommon; breeds" in the Calais region. Data for subsequent years indicate a decline throughout, with even, perhaps, a complete withdrawal from large sections of northern and eastern Maine where a few had bred formerly. Kilburn (1922b: 118) stated: "Knight records it from Aroostook localities. I have never found it." Nor has Chamberlain any records for the past 20 years at Presque Isle. Brewster (*in* Griscom, 1938: 547) did not see the species at Umbagog after 1903.

I saw several of these birds north of Umbagog, at Aziscohos Dam, on June 3, 1945. There has been a marked increase during the past decade, the species again being noted as a regular migrant and breeder, especially inland in southwestern Maine and in southern Penobscot County, there being an increase in spring and fall records coastwise on the mainland to Mt. Desert Island as well.

The northern and eastern limits of the known range in the last few years are indicated by the following records: one seen on June 20, 1940, in Caratunk Plantation, Somerset County (Eckstorm); a male seen on June 26, 1946, at Greenville, Piscataquis County (C. R. Mason); two seen on June 15, 1940, in Aurora, and six seen on July 2, 1941, and four "breeding pairs" on July 1, 1945, at Amherst, adjoining townships in northern Hancock County (Weston); and "rare summer visitant:

probably nests" on Mt. Desert Island (Tyson and Bond, 1941: 72). Although there are a few records by others for this latter locality, it is interesting to note that, in over 20 summers in the field, Bond himself did not see this bird there until after 1941. An unusual occurrence, offshore to the eastward, was on Machias Seal Island (Canadian territory) where a female was seen on June 18, 1947, by Oscar Hawksley.

For interesting comments on the past distribution of this bird in the state, the reader is referred particularly to Norton (1904d: 56), Knight (1908b: 443), and to Brewster's data (*in* Griscom, 1938: 547).

Dickcissel

Spiza americana (Gmelin)

Rare *visitant* (August 19 to November 20) mainly coastwise; records for York, Cumberland, Lincoln, Waldo, Penobscot, and Hancock Counties.

Records. These are listed chronologically by year, and are as follows: a young male collected on September 29, 1884, on Job's Island, Islesboro, Waldo County (Townsend, 1885); a young male taken on October 10, 1888, at Westbrook, Cumberland County (Norton, 1893); a male seen on August 10, 1930, at Saco, York County (E. Ladd); one seen the week of October 29, 1939, on Monhegan (Mrs. J. A. Townsend); a young male collected on November 20, 1939, at Bar Harbor on Mt. Desert Island (Sullivan, 1940b); a female seen November 5 to 13, 1945, at Hampden, Penobscot County (Mrs. P. Hannemann); and one, believed to have been a female, seen on August 22, 1946, at Damariscotta, Lincoln County (J. Cadbury).

Remarks. It is possible that the bird seen on Monhegan in 1939 was the one taken later at Bar Harbor.

One, possibly two, was seen on shipboard at the mouth of the Bay of Fundy on September 23, 1928, and recorded by Rand (1929: 247), who also referred to other records for the Maritime Provinces.

Eastern Evening Grosbeak

Hesperiphona vespertina vespertina (Cooper)

Winter resident, varying in different years from uncommon to rather numerous (apparently absent one recent winter); rare in *summer* (undoubtedly has bred).

Migrations and winter. The birds appear from late October to late February, but most often in December and January. They depart

from early March to early June, most birds leaving March 20 to April 5. Norton (1918a: 173–177) gave four occurrences for the period of May 6 to June 2 in the years 1916 and 1917 for several localities. In one instance, a flock of 35 to 40 birds was seen as late as May 28. In the years since 1921, there have been at least nine records for May, the dates being spread throughout the month, and not over 15 birds seen on any one date.

Summer. From July 21 to 23, 1945, three or four were seen at Presque Isle (Chamberlain). In regard to their activities at this place in the summer of 1946, Chamberlain (*in litt.*, Aug. 19, 1946) wrote: "The Evening Grosbeaks remained at the feeding shelf in small numbers until mid-June. At least two pairs were present. The birds were paired and males, which formerly drove birds of both sexes from the food, did not attempt to drive their mates from the seed. Considerable strutting was in evidence, with crown feathers erected and wings drooping; they also gave a peculiar soft throaty *churr* not heard during the winter months. No song was heard. (Similar behavior was reported from Lewiston [Androscoggin County], by Mrs. G. E. Ramsdell.) A male and an immature bird appeared at the feeding shelf on August 4 and stayed several days. E. C. Ogden and I also heard and saw one bird at Squapan Lake on July 20. The species has been seen in this neighborhood every month of the year."

Mrs. H. G. Whitney of Hampden Highlands, near Bangor, sent the following reply, December 13, 1946, to a request for information: "I do not know where they nested in 1946, although I heard and saw them every day. The day [in early July] I found the young bird I kept hearing an odd sound and hunted for the source for some time. It was a loud odd chirp. Finally I located it in my peony, only about three feet from the door. It was a fat little ball of yellow. I had never seen one like it and wondered what it was. When I started to pick it up it did not try to fly but sat back on its haunches, as if to fight. I put it on a spruce tree, about half way up and it kept going from limb to limb until it was on the top branch, calling most of the time. Then I saw the mother feed it and heard her call, so knew what it was. She fed it a couple of times and then it flew to a maple nearby and I did not see either of them again."

For the same summer, Gross (1947a) wrote: "Another report has come from Castine [Hancock County], Maine, in which the observer claims to have seen an adult male . . . with four young." For 1947, Gross (1947e) wrote: "A male and female were seen May 27, and a male on June 19 . . . at Wiscassett, Lincoln County." MacMillan (*in* Dana, 1948a: 9) wrote: "A male and female . . . were seen at my feeding station in Freeport [Cumberland County] on August 2, 1947.

The birds appeared for about an hour during the morning and then left, not to be seen again."

Ecology. This species is particularly attracted by seed of the box-elder maple (*Acer negundo*), a tree that, according to Hyland and Steinmetz (1944: 40), apparently was introduced into Maine, and now grows on waste land and along rivers near habitations, but not in woods distant from urban areas. Many of the wintering flocks are fed large quantities of sunflower seeds by individuals and bird clubs, this food supply undoubtedly being a factor in delaying the departure of the birds in spring.

So little is known of the nesting habits of this species that it is hardly safe to speculate on where it will be found nesting in the state. Both conifers and hardwoods are said to be used. A recent report from Ontario is for two nests in black spruces, 28 and 30 feet above ground (Hope, 1947). This species probably is not an early nester.

Remarks. This species has been making invasions eastward of its former known range and occupying new territory for over 90 years. Norton (1918a) presented many data on this subject, especially in relation to occurrence in Maine, where the bird was not recorded prior to January 10, 1890, the next record being for early in 1909, then in November, 1909 and 1912, and March and December in 1913. His paper and unpublished notes, for the period following 1913, show that the species has occurred, varying in numbers, during at least part of every year since then, except possibly the winter of 1937–38, for which no records have been found. This bird appeared in great numbers, relatively speaking, in the winters of 1915–16, 1917–18, in early 1944, and in 1946–47. By far the largest numbers were noted in 1944.

Chamberlain has supplied me with nine records of recoveries of banded birds which have made east-west, or vice versa, long distance travels. In 1934, one was banded on April 3 at Presque Isle and recovered on June 11 at Sault Ste. Marie, Michigan, a period of 68 days. The next shortest period between these points, in the same order, was 78 days, from February 21, 1942, to May 9th. There are other records for longer periods and also two for the reverse route, the shorter time being November 24, 1938, at Sault Ste. Marie, and April 15, 1939, at Presque Isle, Maine.

Eastern Purple Finch

Carpodacus purpureus purpureus (Gmelin)

Summer resident, common in eastern Maine, including larger islands, and fairly common elsewhere; *winter resident,* varying in different years from uncommon to numerous, the latter in *incursion* years; probably transient also.

Spring. Migration apparently takes place throughout April and early May. The flocks that move about in March, often appearing at places where they had not been noted earlier in winter, probably are wintering birds in many instances, rather than arrivals from any distance southward (but see Incursions).

Fall. It is impossible to determine the period covered by migration at this time, but apparently it is from about September 6 to October 24, with most birds leaving before October 10.

Incursions. In *1883–84*, the incursion that was noted in winter about Cambridge, Massachusetts, as recorded by Brewster (1906: 255), apparently reached Maine, for J. G. Rich (1884) reported this species as abundant the first week in January, 1884, at Bethel, Oxford County. In *1939*, an incursion reached Maine in late February and the first half of March, flocks of 200 and even 300 birds being seen, as reported by Weaver (1939); there were no York County records, but birds were noted on the coast from at least Portland to Mt. Desert Island, and inland to Rumford, Oxford County, and Presque Isle, maximum numbers being present from March 15 to April 10, but with the melting of the snow, they gradually dispersed and only ordinary numbers were seen that summer.

Breeding. "The nests are generally placed in evergreen trees, at various heights from ten to forty feet from the ground, usually near Bangor nesting in the top of a small pasture spruce or fir tree at twelve to fifteen feet elevation, the nest being well concealed in the thick top. A nest found at Hermon [Penobscot County], June 4, 1905, is typical, being placed in the top of a small fir tree in a dense bunch near the top, about twelve feet from the ground in a pasture. This nest was built on a foundation of numerous small spruce and fir twigs, lined with fine roots, lichens and horsehair" (Knight, 1908b: 374). Both sexes aid in nest building (ibid. 375).

The earliest egg date is for a set of three fresh taken on May 30, 1893, by C. H. Morrell at Pittsfield, Somerset County, and in the U. S. National Museum. Next earliest is for five eggs in the nest described by Knight above. Goodale (1893), who stated that he found this bird nesting in the tops of thick trees in woodlands, reported a set of five eggs, taken on June 10, 1893, from an apple tree at Saco, York County. A set of three was taken on June 25, 1863, by S. Smith at Norway, Oxford County, and is in the U. S. National Museum. Knight (1908b: 375) stated that four to six (usually five) eggs are laid, but the available records, all cited here, indicate that sometimes three make a clutch. Knight (ibid.) stated that the female incubated the eggs, except he once found the male assisting, that the period was about 13 days, and that fledging was 14 days, both parents feeding the fledged young. One brood is raised yearly.

Winter. This species has wintered in Maine since at least the early 1880's. The erratic behavior of these birds at this season makes the picture confusing, as flocks may stay all winter in one place, or suddenly leave at any time. "Many have been banded [at this season in Presque Isle], but none have returned or been recovered elsewhere" (Chamberlain). Regarding those banded at Orono, Penobscot County, in the winter of 1938–39, Mendall writes that there have been no recoveries of them.

Ecology. The Purple Finch is a bird of the tree tops in mixed coniferous-deciduous woodlands. It has fitted in well with man-made alterations in the landscape, frequenting orchards, trees in pastures, and the edges of woodlots, yet it may be found often in remote woods, far from human habitations. The wintering birds feed on a wide variety of seeds and dessicated fruits and berries, a portion of which are cultivated. It has long been suggested that the shifts in winter populations are caused by a fluctuating food supply, but data to substantiate this are, as yet, lacking.

Remarks. There have been a few noteworthy local winter concentrations, the data indicating that numbers involved did not reach incursion proportions. On March 19, 1888, the then current abundance of this species at Portland was a subject for discussion, as reported in the *Records* of the Portland Society of Natural History (vol. 2, p. 126), and J. C. Brown (1888) wrote that that was the first winter the species had remained there. Many were seen in Portland in February, 1912 (N. C. Brown, 1912a). From January on, in 1913, many were seen in Brewer and vicinity, where Eckstorm collected a series.

A dull cream-colored specimen was shot at Lake Umbagog some years prior to 1879 (Deane, 1879a: 28). A yellowish individual was seen in late March and early April, 1939, at Presque Isle (Chamberlain).

Newfoundland Pine Grosbeak

Pinicola enucleator eschatosus Oberholser

Winter resident, varying in different years (subject to *incursions*) from uncommon to numerous throughout; *transient,* in fall and early spring, also varying in numbers in different years (from nearly absent to numerous); rare in *summer* (no recent breeding record).

Migrations and winter. There are at hand 24 records, none for more than six birds, for southern Maine, with dates ranging from September 10 to October 15; probably these being for birds that had spent the summer, or were reared, in northern Maine or not far from its borders. Migrants from distant points appear at any time from about October

15 to late February, but generally from late November to the middle of January. As a rule, if the flight is very large, the species tends to arrive early. For 1912, a year when few occurred, I find no records of birds seen before March 3. In some years the flight continues west and south of the state for a considerable distance.

From insufficient data, it cannot be determined whether the flocks that depart in March have come from more southwesterly points or are birds that have wintered in the state. A few flocks, usually of less than eight birds, are last seen on April dates and in early May. I am unable to ascertain whether this species has been entirely absent in any winter, although numbers have been very small during quite a few.

Incursions. Notable numbers were present in: *1837*, in Knox County in January and February (C. Eaton, 1851: 340); *1875*, numerous in southern counties the third week of January to the third week of March (N. C. Brown, and others); *1889–90*, common in at least southwestern counties, and unusually early, from October 5 on (Brewster *in* Griscom, 1938: 528; and others); *1892–93*, a very large incursion, beginning in November, with abundance in at least the southern half of the state, coming from Labrador or Newfoundland (Brewster, 1895b; Knight, 1896a); *1895–96*, very large flight in central Maine, beginning perhaps in late October, with limits of occurrence not known (Knight, 1896c; and others); *1903–04*, abundant at Bethel, Oxford County, from December 11 to March 26 (Brewster *in* Griscom, 1938: 528), and fairly numerous at least to central Maine (various observers); *1916–17*, widespread flight, but mostly in small flocks, from December on (various observers); *1923–24*, the influx noted by Forbush (1929: 7), in this mild winter, was of considerable proportions in southern Maine, from mid-November on (Rich and others); *1933–34*, widespread, and in fairly large flocks, beginning the third week in November (various observers); *1936*, large numbers at widely scattered points from early January on (Mendall, Norton, and others); *1943–44*, widespread and abundant after November 10 (many observers); and *1945–46*, the population building up from late November into January (many observers).

Summer. For former breeding, see Remarks. In giving county status, Knight (1908b: 366) listed this species as occurring in summer in Oxford, Somerset, Penobscot, Aroostook, Hancock, and Washington Counties. In the latter part of August, in 1884 or 1885, Carpenter (1886b: 146) was confident that he saw a female on Boil Mountain in Township 3, Range 5, Franklin County. In 1911, this species was observed August 10, 27, September 2 and 7, on Mt. Desert Island and Baker's Island five miles away, an adult male, two adult females and three young being seen on the last date (Pepper, 1911). A single bird

was seen on July 28, 1938, on Hog Island in Bremen, Lincoln County (D. J. Borror).

Ecology. This is a bird of spruces, firs, larches, and pines, feeding on the seeds, and sometimes buds, of various conifers. In winter when the birds have moved to deciduous or mixed-wood areas, they are found most often feeding on the fruit of mountain ash, dried apples on orchard trees, seeds of the fruit of high-bush cranberries, and seeds and buds of various deciduous woody shrubs and trees. Winter associates are Evening Grosbeaks, Purple Finches, and Cedar Waxwings.

Remarks. Only one nest has been found. In May of 1903 or 1904, one was found at "Hale" [Heald] Pond, in Moose River Plantation, north of Jackman, Somerset County, by Miss M. K. Maddox, who stated (*in* Knight, 1908b: 367–368): "The nest was not in thick woods but in open pasture near the Canada Road. It was woven of twigs and moss, lined with rabbit's hair and contained four pale-green eggs, flecked with purple and hardly to be distinguished from the moss itself. This nest was in a fir tree about four feet from the ground. . . I find that the incubation was completed on May 27, being the thirteenth day after the fourth and last egg of the clutch appeared in the nest. The female bird as far as I could learn did all the sitting. Several times I surprised the male bringing her food and saw her leave the nest and receive it from him, near but never on the nest. Both parent birds fed the fledglings after they left the nest, which occurred the twentieth day after they were hatched."

Less definite reports of nesting are as follows: a male in juvenal plumage collected on August 27, 1874, at Upton, Oxford County, by Brewster (1878b: 116), who also stated (*in* Griscom, 1938: 528) in his notes for that year, for the Umbagog region: "obviously nested, as juveniles in first plumage were collected in late August and early September"; J. Waldo Nash reported (*in* Knight, 1908b: 366) seeing a pair of adults with four young, "just out of the nest," on unstated date in 1882, in the mountains at Stow, Oxford County; and a juvenal-plumaged bird, in the collection of the Academy of Natural Sciences at Philadelphia, that was collected by Dr. W. L. Hughes on August 31, 1897, at King and Bartlett Lake in Somerset County, and that "apparently had only shortly before left the nest, although the date is remarkably late for the species to be breeding" (Bond).

At Paris, Oxford County, a captive female began laying eggs in May, 1879, laying nine in all, but the male with her destroyed some of them (Smith, 1882–83: 465). Knight (1896a: 23–24) reported on a female bird, secured at nearby Orono, that he kept in captivity at Bangor. Notwithstanding several unsuccessful attempts at mating

her with captive males, the female did some nest building and laid a total of 23 eggs in three years—two the first year, one set of five and one of two the second year, and one set of five, one of four, and two of three the third year—with laying dates ranging from May 28 to July 27.

Coues (1882: 264) stated that the first nesting record of this species in North America was for a nest and six eggs taken on July 6, 1863, at Musquash, New Brunswick. He also mentioned (ibid.) two eggs, in a nest in an alder bush, that were taken on unstated date by Boardman, "at Calais," and that "were identified with little doubt, though the parent was not seen." These may have been the eggs referred to by Boardman (1869a) in stating that he had collected the eggs of this bird in the spring of 1868. Either the two eggs from the alder bush also came from New Brunswick or else he changed his mind about their identity, for later Boardman (1896) wrote: "The Pine Grosbeak I have known to remain with us in summer and have known the eggs to have been taken across the line at Musquash, New Brunswick."

T. M. Brewer (1854: 42) mentioned a report of two nests (one with young), "probably" of this species, found in February at Bristol, Lincoln County. Considering the season, however, this report would seem more likely to refer to crossbills. The species was reported seen in August, 1911, on Long Island in Casco Bay, by Curtis (1912), but Norton noted in his files: "I have reasons to believe that the bird seen was the Red Crossbill."

A few birds have been noted, in past years, in northern New Hampshire in summer, where they may nest.

Canadian Pine Grosbeak

Pinicola enucleator leucura (Müller)

Three specimens. A male, taken December 4, 1906, at Buckfield, Oxford County, was recorded by Griscom (1934: 8), without stating in what collection he found it. An adult male and female, numbers 262 and 263 in the Eckstorm collection, were taken on February 17, 1913, at Brewer. The wing of the male measures 121 mm. and the bill is over 10 mm. in width at the base, and the wing of the female 115.5 mm. and bill over 10 mm. wide. These skins are now numbers 1306 and 1312, respectively, in the University of Maine collection.

Remarks. A study of the many Maine specimens in various collections may reveal other examples of this large race.

Hepburn's Rosy Finch

Leucosticte tephrocotis littoralis Baird

On December 15, 1936, one appeared at a feeding shelf in Gorham, Cumberland County. It remained about the premises, and on March 7, 1937, was trapped and banded, weighed, measured, compared with museum skins, and photographed. After being released, it remained in the vicinity until at least March 10. These data are from the note by Gross (1937b), which was accompanied by a photograph of the bird.

In my opinion, there is merit in the suggestion by Taber (*in* Eliot, 1938: 10) that this bird may have gotten into a freight car of grain, and so been transported to Portland from the west. There are no other records of occurrence east of the Mississippi River.

Coues' Hoary Redpoll

Acanthis hornemanni exilipes (Coues)

Two specimens. Norton (1897b: 104) reported collecting a "female apparently not fully mature" on January 26, 1896, at Westbrook, Cumberland County. He later (1909c) reported collecting an adult male on February 14, 1909, at the same place.

Remarks. I failed to locate the 1896 specimen when searching for it, in early July, 1947, in the collection at the Portland Society of Natural History. The 1909 bird was found and submitted to Mr. J. L. Peters, at the Museum of Comparative Zoölogy, who concurs with Norton's identification.

There are sight records at hand, published and unpublished, ranging in dates from late December into May (when dates are given), and generally referring to one, two, or a few birds, in company with Common Redpolls. In view of the variation in appearance of the Common Redpoll, I do not feel it advisable to accept any sight records of Hoary Redpolls. Admittedly this is a conservative course to follow, since Norton's notes reveal that he recognized a Hoary Redpoll at Westbrook on the two days preceding the capture of the 1909 specimen.

Mealy Redpoll; Common Redpoll

Acanthis flammea flammea (Linnaeus)

Winter resident and *transient*, varying in different years (subject to *incursions*) from very few (? or absent) to abundant throughout.

Migrations and winter. Birds are reported from October 5 on, reports becoming increasingly frequent for subsequent dates in the

month. October and early November reports are for small groups, the large flocks not arriving until after the middle of November. In some seasons, arrival in numbers does not occur until January or even March. It appears that in the case of an early arrival, many of the birds may continue southwesterly and out of the state, whereas a late one may indicate either wandering for food or a return northward from more southwesterly points. In some years the early flocks stay all winter, perhaps when finding an adequate food supply in the state. I am not aware that the species ever is entirely absent throughout in any one year, though there are several for which reports are lacking, and Chamberlain notes that "occasionally they skip a season with us" at Presque Isle.

Maximum numbers generally occur in February and March, decreasing rapidly in April, and after the 15th, only stragglers occur. Of the several May records, the latest is for May 19, 1875, in the Portland region, as reported by N. C. Brown (1882f: 12). Brown's diary lists two birds seen that day.

Incursions. In the following list, where the data are for a limited area, it is probable that the flight was more widespread than is indicated: *1875,* abundant in Cumberland County from February to March (N. C. Brown); *1878–79,* a very large flight in western Maine in winter (Mead, 1897a); *1888,* very abundant in Cumberland County from March 24 to April 7 (Norton); *1895–96,* numerous in Cumberland County from December to early April (Norton); *1899–1900,* numerous throughout from late December on (several reports); *1910–11,* numerous in Cumberland County from mid-December to early March (Norton); *1913–14,* numerous throughout in winter (several observers); *1921–22,* abundant early, but most passed on, not wintering (Kilburn, 1922c; and others); *1922–23,* numerous in winter (Kilburn, 1923: 37; and others); *1925–26,* numerous in winter, especially in March (Norton, 1926c: 464); *1934–35,* fair numbers, at least in southern Maine, in winter (several observers); *1938,* fair numbers in February (several observers); *1939,* numerous throughout in March (Mendall, Norton, and others); *1941,* large flocks throughout from January to March (several observers); and *1946–47,* abundant throughout from December to April (many observers).

Ecology. "Early in the fall or winter it may associate freely with Siskins, both feeding in flocks . . . upon the seeds of alders and gray birches. Toward spring, no doubt owing to the exhaustion of this supply . . . the birds resort more constantly to weed patches and bare ground, being especially partial to old broken ground. At this season they usually congregate in larger flocks than earlier . . . During the cold weather of mid-winter, they often settle in a good

sized grove of alders or birches where they remain until the seeds become exhausted when they seek new quarters. In feeding here many of their movements among the twigs resemble those of chickadees, flitting about and hanging upside down as they probe between the scales of the cone, a use to which their small, pointed beaks are beautifully adapted. As they move about they scatter much seed to the ground and . . . they will descend to the snow and glean the fruit from its surface. The diet is occasionally varied by visits to spruce or hemlock trees, or more often to larch" (Norton, 1904a: 4–5).

The rarer kinds of Redpolls occur in flocks of the present bird, and wintering Goldfinches also join the flocks.

Remarks. On March 9, 1936, Mrs. E. A. Anthony observed Redpolls bathing in snow, on a roof, at Great Head on Mt. Desert Island. It was wet snow and changing to rain. The birds would take a series of vigorous hops to gain momentum, then plunge and burrow head first until almost out of sight. They fluttered their wings like birds taking a water bath. They would then remain quiet for several minutes, and emerge, flutter their wings, throw snow over themselves with their bills, and hop to another place to repeat the bathing. When a bird came out of a hole, another would dash into it, the first going into another hole or making a new one. About 50 birds kept this up for an hour and left the snow on the roof only after they had honeycombed it with holes.

Rather light, buff-colored Redpolls are in first winter plumage; the buffy cast disappears as winter progresses.

Eckstorm wrote to Norton that, on May 2, 1938, he "saw a mated pair in Township 10, Hancock County. The male was singing. I observed the female at a distance of about six feet. Three days later I could not find them there again." Boardman (*in* Knight, 1908b: 382) reported that this bird was a "summer resident" in Washington County. There are a few other reports, all unsatisfactory, of birds seen in summer.

Two specimens have been referred to the subspecies *holboellii*, but in view of the likelihood that they will prove to be aberrant *flammea* on re-examination, I am not listing them under a separate heading. One, a male shot on November 25, 1878, at North Bridgton, Cumberland County, was reported by Mead (1897a). It was considered nearer *holboellii* than *linaria* [=*flammea*] by Brewster with whose identification Robert Ridgway concurred (Powers, 1897e). Although it was donated to Knight's collection (Knight, 1897d: 93), now in the Portland Society of Natural History, I did not locate it or the following specimen there in July, 1947. Norton (1904a: 5) reported collecting a female on January 3, 1903 [error for 1900], at Gorham, Cumberland County.

Greater Redpoll

Acanthis flammea rostrata (Coues)

Winter visitant or resident, varying from rare to numerous in those winters when it occurs.

Records. Specimens here listed have not been examined by me: this species was common at Westbrook, Cumberland County, from January 26 to February 27, 1895 [error for 1896] (Norton, 1897b: 104), when several were collected; a female was shot February 17, 1896, at Sprucehead in Thomaston, Knox County (Norton, 1904a: 5); one shot December 30, 1896, at Gardiner, Kennebec County (Powers, 1897a and 1897e); one shot December 12, 1903, at Westbrook (Norton, 1904a: 5); and "A mounted specimen in the American Museum of Natural History, New York City, bears the label, No. 3046. Ward Collection, Male, Brunswick [Cumberland County], Maine" (Walch, 1926: 60).

The following specimens were examined in 1947 by Mr. J. L. Peters and myself: male shot March 4, 1912, by Eckstorm at Brewer; male secured March 7, 1936, by Mrs. J. Corning at Yarmouth, Cumberland County; and one male and two females taken March 8, 1942, and another male the 17th, by Gross at Brunswick. Grant (1926) reported a few in spring of 1926 at Patten, Penobscot County, and one killed which Peters examined. (See Remarks.)

Ecology. "In habits it does not seem to differ from *Acanthis linaria* [*A. f. flammea*] with which it freely associates. It may, however, prove to be a little more partial to coniferous fare, as several of those collected in 1896 had their bills coated with pitch, and the birds often resorted to hemlock trees to feed. They also resorted to the ground to feed as did . . . [*Acanthis f. flammea*]" (Norton, 1904a: 5).

Remarks. In connection with the Brunswick occurrence during March, 1942, it is interesting to note that during the month, Gross banded about 150 Redpolls, the majority of which he believed to have been of this subspecies. During the same spring at Presque Isle, Chamberlain banded some very large Redpolls and released them before suspecting their probable identity. On March 5 of the same year, several very large birds were seen at Canton, Oxford County (J. Parlin), and four on the first of April at Brewer (Weston).

Sometimes a fairly large Redpoll is not easy to identify even when in the hand. A female shot on March 4, 1912, in company with a male *rostrata* at Brewer, was considered to be *flammea* by Eckstorm, *rostrata* by Brewster and myself, and *flammea* by J. L. Peters, who had adequate material for comparison when examining it.

Northern Pine Siskin

Spinus pinus pinus (Wilson)

Very erratic in occurrence, numbers, and seasons of occurrence, having occurred at all seasons in variable numbers; *breeds.*

Migrations and winter. There is a movement southwestward away from areas of extensive coniferous forests during the latter half of October (occasionally earlier) and in November. Most birds depart in April or, occasionally, in early May. Movements are erratic, however, and birds may appear in numbers, and depart, at any season.

Breeding. The nest usually is placed on a densely-foliaged limb of a conifer, out from the trunk, and above eight feet from the ground. It is a flat structure, loosely put together, of twigs, rootlets, moss, grass, or other material, and lined with fine rootlets, hair, fur, feathers, or other fine material. On April 2, 1878, a female, containing eggs with one nearly ready for laying, was shot at North Bridgton, Cumberland County, and on April 24 a nest containing four young was found there (Mead *in* Smith, 1882–83: 466). Young out of the nest were seen being fed on June 11 of unstated year on Mt. Desert Island (Bond *in* Tyson and Bond, 1941: 72). In 1873, this species was still breeding in August at Lake Umbagog when fledged young were present (Brewster *in* Griscom, 1938: 535). From the data given by Brewster, it would seem that the species was nesting in loose colonies and that probably two broods were raised there that year.

From New Hampshire, Weaver and West (1943: 503) reported that a female built a nest in five days, accompanied by the male on her trips during nest construction; incubation, by the female, began after the first egg was laid and required 13 days; the male fed the female during incubation and eight days thereafter; the female fed the young at first, by regurgitation, and both parents fed them during later nest life; and the young left the nest on the fifteenth day after hatching.

Ecology. In summer these birds generally are found in conifers, or mixed growths of conifers and birches. Apparently this species ordinarily does not nest in the same area in successive years.

Although very similar to the Common Redpoll in winter food habits, and the two gregarious and social species often intermingle, when both occur in numbers in the same area, each species tends to keep to its own flocks. The Siskins then show a tendency to feed more exclusively on seeds of deciduous trees than do the Redpolls. The Goldfinch is another common associate in winter and early spring.

Remarks. There seems to be no good evidence that this species is ever numerous or abundant throughout the state, but this may be due to lack of observers. In the following reports of noteworthy occur-

rences, references to the Umbagog region and to Bethel, Oxford County, are from Brewster's studies during his somewhat irregular visits there (*in* Griscom, 1938: 534–536, 613–614): in 1871, common in late May and early June at Umbagog, in 1873 abundant from June to early September, and in 1876 common there from late May to late June; in 1884, very plentiful in spring at Calais (Todd, 1885); in 1888, common from September 1 to October 12 at Umbagog; in 1897, abundant from May 26 to July 5 at Gardiner, Kennebec County (Powers, 1897i); in 1899, common from January to April, in Westbrook and vicinity, Cumberland County (Norton); in 1907, abundant in July at Bethel; in 1922, abundant in fall at Machias, Washington County (Kilburn, 1923: 37); in 1922–23, numerous from September 28 through the winter, at Turner, Androscoggin County (Poole, 1923); in summer and fall of 1925, abundant at Patten and vicinity, Penobscot County (Forbush, 1929: 32); in 1936, common in fall at Machias and vicinity (Mendall); in 1938, scattered flocks coastwise in summer (various observers); in 1939, from March to April, several hundred on Mt. Desert Island (Mrs. E. A. Anthony) and large flocks in the Bangor region (Mendall); and in winter of 1947–48 many were in Somerset and Piscataquis Counties (and probably adjoining areas) and bred there in 1948 (Palmer and others).

During severe weather in March and April, 1939, many Siskins died on Mt. Desert Island.

When "thousands" appeared at Patten in 1925, they stripped beans, beets, and other plants of their leaves and ate the blossoms of flowering plants (Forbush, 1929: 32). It is interesting that similar cases of such behavior were reported from British Columbia by T. and E. McCabe (1929).

In Vermont, young have been found ready to leave the nest as early as March 19 (Forbush, 1929: 30).

Eastern American Goldfinch

Spinus tristis tristis (Linnaeus)

Summer resident, fairly common throughout; *transient,* common in spring and fall; *winter resident,* usually common in at least a few localities, though in some winters perhaps rare or absent.

Migrations. The spring migration apparently extends from late April well into June. The fall migration begins in September and continues to the end of November.

Breeding. "The nest is placed in various shrubs and trees at heights of four to forty feet from the ground. They rather seem to prefer to

nest in maple trees near Bangor, selecting those bordering the highway but elsewhere they nest in more varied situations, various evergreen and hardwood trees, willows and alders along streams being often selected" (Knight, 1908b: 387). The nest usually is composed of plant fibers and lined with a compact layer of thistledown. Knight (ibid.) wrote of a nest which was built in nine to ten days and the first egg laid on July 29. An egg was laid daily until the clutch of six was completed on August 4. A set of four fresh eggs was found August 1, 1887, at Westbrook, Cumberland County (Norton); five fresh eggs were collected on August 3, 1911, at Holden, Penobscot County (Eckstorm); four eggs were noted on August 12, 1881, at Bangor (Eddy, 1881); and five fresh eggs on September 5 (? in 1882) at "White's Corner" (Ritchie, 1882).

Incubation was reported as 11 days, by Norton (1903b: 46), who stated that hatching occurred over a three-day period, indicating that incubation began before the clutch was completed. The last young bird left this nest on September 1 or 2, 1902 (ibid. 47).

The following is a summary of a study by Gross (1938b), made near Brunswick, Cumberland County, in 1937. A nest was found partly built, 28 feet above the ground in a gray birch, on July 5. The female did the building, the male invariably accompanying her and occasionally bringing material. The first egg was laid the afternoon of July 11, and an egg on each of the succeeding four mornings. When there were five eggs (July 15), the female began incubating and was fed, by regurgitation, by the male. On the 16th a sixth egg was laid before 8 A.M. The female did all incubating, being fed by the male from about dawn to after sunset. He announced his coming with a series of warbling notes. The female's feeding response was to throw her head back, open her bill widely, and flutter her wings. The male was observed to chase the female if she left the nest. On July 27 the first egg hatched at 9 A.M., with five eggs hatched by 6 P.M.; the sixth egg hatched the next day. The incubation period was 12 days. For five or six days the female brooded the young day and night, the male feeding both mate and young by regurgitation. As the young grew older the female spent less time on the nest and the male ceased feeding her. He fed more young per visit and more energetically than did the female. By the tenth day the female, who had ceased brooding by day except in bad weather, roosted in nearby branches at night. On August 9, when the young were 13 days old, all left in a five-hour period, the strongest being able to make short flights from limb to limb at this time.

One brood is raised yearly.

Winter. This species has wintered at various points throughout the

state. Although there are fewer inland records than for coastal counties, there are also fewer observers. As long ago as the winter of 1876–77, a severe one, this species was present in numbers at Houlton and elsewhere in Aroostook County (Batchelder, 1882: 147).

Ecology. This bird usually is found in or about cultivated and pasture lands and old fields. Here it feeds on and near the ground, and finds nesting sites in trees and bushes in the vicinity, selecting those having fairly open crowns. It also is found in areas remote from cultivated places, usually about the shores of lakes or ponds. It is more given to bathing than most other small birds. Wintering birds eat seeds on weed stalks protruding above the snow, especially seeds from the pods of *Oenothera* in early winter. More rarely they feed on seeds of hoary alder (*Alnus incana*) and other trees. Associates in winter and early spring, when the species travels in flocks, are Siskins and Redpolls.

Remarks. The prenuptial molt of body plumage of males often is noticeable as late as the last week in May.

It is a common belief that this bird waits for thistledown for nest lining before beginning to build. This material is available for weeks before nesting usually is begun.

European Goldfinch

Carduelis carduelis subsp.

One sight record of this *introduced* Old World species. A male was seen on July 10 and 11, 1938, with American Goldfinches at a feeding station on Ohio Street, Bangor (Mrs. H. Farnham and Mrs. P. Hannemann).

Red Crossbill

Loxia curvirostra minor Brehm

Very irregular in occurrence and numbers; may occur and remain for long or short periods in every coniferous forested section; *breeds*; usually more numerous in fall, spring, and winter, but no season is without its visitations, and probably at no place can it be found at all times, though more regular in northern counties than elsewhere.

Breeding. The nest usually is placed in a conifer and at varying heights from the ground. Audubon (1834: 559) wrote: "Many persons in the State of Maine assured me that they had found it on pine-trees in the middle of winter, and while the earth was deeply covered with snow. The people employed in cutting pine timber at that season . . .

have frequently told me, that on felling a tree they have caught the young Crossbills, which had been jerked out of their nest." Boardman wrote to Bicknell (1880: 9) that in Maine, "the nest has been found in thick trees, also in hardwood trees and in holes," that usually, "some warm material (old-man's-beard, a species of hanging moss) is used," and that, "the bird sits very close." The report of hole-nesting may have come from some woodsman who, having found a bird or more after chopping down a tree, came to this erroneous conclusion.

"While a crew of lumbermen were at work about ten miles from Lubec [Washington County], Me., on January 29, 1910, they noticed, to their surprise, some small birds roll out of a tree which they had just cut down. On investigation they found a nest and three small birds about three weeks old, two of which had been killed by the fall. The living one was brought to me and identified as a Red or American Crossbill. It died two days afterward and I had it mounted" (Clark, 1911b).

In the Museum of Comparative Zoölogy there is a nest of this species which Hardy sent from Brewer on June 24, 1889, taken from a juniper in a pasture, apparently at or near Brewer.

Evidence of breeding, generally consisting of parents seen feeding fledged young, has been noted in Maine throughout the year except in November and December. The young are fed by regurgitation. After raising one brood, and very likely two sometimes, in one place, this species may not breed or even occur there again in any numbers for months or years. Brewster's Umbagog data indicate that the species is given to gregariousness even when believed nesting. This tallies with the Nova Scotia data of H. Tufts (1906: 339), who reported observing, in January, males leave flocks to regurgitate food into the bills of incubating females.

I find no accurate information on incubation and fledging periods.

Ecology. Both crossbill species feed on the seeds of cones or pine, spruces, larch, and other conifers, their nomadic movements being closely related with the success and failure of the cone crop. Griscom (1937: 82) has discussed the interspecific competition of the Red with the White-winged Crossbill, pointing out that there are few known instances where the two species breed at the same place and time, and then only where there was an exceptionally large cone crop. Both species are gregarious and social, mixed flocks being noted fairly frequently.

Remarks. Although not always indicative of how widespread they were, noteworthy occurrences in numbers of this species, regardless of subspecies, were reported as follows, with all references to the Umbagog region from Brewster (*in* Griscom, 1937: 83): 1850–51, abundant in

winter at Bethel, Oxford County (T. M. Brewer, 1854: 42); 1874–75, abundant in winter in Cumberland County (N. C. Brown); 1879–80, abundant in winter at Umbagog; 1881, abundant in the Rangeley region, Franklin County, early in the year (J. G. Rich, 1881: 47); 1882–83, numerous in winter in Cumberland County (N. C. Brown); 1885, common in Somerset County in summer (Carpenter, 1886a: 25); 1885–86 through 1887, abundant at Umbagog; 1888, numerous in Cumberland County late in the year (N. C. Brown, Norton); 1889, abundant at Umbagog in September and October; 1895, arrival date unknown, but abundant at Umbagog in late August, and, according to Knight (1895b), numerous at Jackman, Somerset County, in the same month; 1896, still common at Umbagog, and, according to Knight (1896f), in "considerable numbers" in June in the Bangor region; 1896–97, common in winter in Cumberland County (Norton); 1897, continued common at Umbagog through the year; 1899, numerous in Cumberland County in June and July (N. C. Brown, 1900a), abundant at Umbagog in fall, and, according to Norton, in Cumberland County the same season; 1903, abundant at Umbagog from May on; 1908–09, abundant in winter in Cumberland County (Norton and others); 1922, numerous over widespread areas in northern Maine in summer (several observers); 1931–32, fairly numerous in winter throughout (several observers); 1934 and 1935, fairly numerous at least coastwise (several observers); 1940, common coastwise from Sagadahoc County eastward in summer (several observers); and in 1946, fairly common at several inland and coastal localities in summer (several observers). (See Remarks under *L. c. pusilla*.)

J. G. Rich (1883) wrote: "It was proverbial of certain families [poor families in the Rangeley region in 1844] that they lived on blue-backs [blue-backed trout] and crossbills—the crossbills were birds they also dried whole, without dressing and so provided their summer food in the fall and winter beforehand."

Brewster (*in* Griscom, 1938: 531) reported that this species came mornings to the chimney of a shop, in the Umbagog region, where they clung to the sides and perched on the top, the owner of the shop informing him "that they come to the chimney regularly through the winter," apparently to get warm.

Josselyn (1674; 1865b: 79) mentioned the "Dunneck or hedge-*Sparrow* who is starke naked in his winter nest." He may have been referring to either crossbill species or possibly the Siskin.

M. Wright (1908: 271) stated that Coues mentioned a nest found in Maine in February. I am unable to trace this. Coues (1868: 281) mentioned, on authority of Boardman, that the Red Crossbill was said to breed in winter.

Smith (1882–83: 466) wrote of two nests of crossbills of unstated species. These were found in Franklin County in the latter part of February, one with three apparently fresh eggs, and the other with five eggs near hatching. The nests were substantial structures of moss, both in the same spruce tree and six or eight feet apart, and were found when the tree was cut. A person, writing under the pseudonym of Pine Tree (1893), reported a nest with five young, found many years earlier in February at Little Island Pond, in Seven Ponds Township, Franklin County. Here also, the species of crossbill was not stated.

Newfoundland Crossbill

Loxia curvirostra pusilla Gloger

Three specimens, in the collection of the Portland Society of Natural History, were taken on November 9, 1882, in Cumberland County, and have the color characteristics of this race as given by Griscom (1937: 117). N. C. Brown's catalogue numbers and my measurements, for wing, culmen, and depth of bill, are: no. 3469, ♂, 96, 17.5, 11; no. 3470, ♂, 95, 17.5, 11; and no. 3471, ♀, 93, 17+, 11.

Remarks. See Remarks under the preceding bird, *L. c. minor,* for a listing of all known flights of the species, regardless of subspecies. It will be noted that Brown saw numerous birds of the species in Cumberland County all through the winter in which he took the above three specimens. Parenthetically, it should be noted that he collected *L. c. minor* there nine days after *L. c. pusilla.*

On the basis of specimens, the Newfoundland subspecies is known to have occurred in Massachusetts and points farther southward in the winter of 1919–20 (Bent, 1920; Forbush, 1929: 17), but apparently nobody noted a flight in Maine (if one occurred) that season. A specimen of this race was taken on April 1, 1932, in Massachusetts (Kennard, 1932), and it will be noted, on the basis of sight records, that *Loxia curvirostra* of undetermined subspecies was fairly numerous throughout Maine that winter.

This bird probably occurs irregularly and perhaps generally coastwise. Of all the Red Crossbills collected by Brewster at Umbagog, none were of this subspecies.

American White-winged Crossbill

Loxia leucoptera leucoptera Gmelin

Very irregular in occurrence and numbers; may occur and remain for long or short periods in every coniferous forested section; *breeds*;

usually more numerous in fall, spring, and winter, but no season is without its visitations, and probably at no place can it be found at all times, though more regular in northern and in eastern coastal and inshore island sections.

Breeding. Probably the nest generally is placed in a conifer. Hardy wrote to William Brewster, describing a nest found near Brewer that is now in the Museum of Comparative Zoölogy. It was ten feet from the ground and two or three feet from the trunk of a spruce in a grove of these trees about an acre in size. Both male and female were observed working on the nest when the lining was being added. It was finished on July 19, 1889.

Evidence of breeding (similar to that for *L. c. minor*) has been noted in Maine by competent observers from early February through June and in late August. Further, males have been heard in song in fall and early winter. Boardman (1903: 48) wrote to J. A. Allen, on October 29, 1869, stating that "Crossbills" bred "all the season from February to May and perhaps later." That this was not repeating hearsay was shown by the fact that Boardman (1869a) reported having collected the nest and eggs of the present species "in the spring of 1868," but whether in Maine or New Brunswick was not stated. A. Leith Adams, a friend of Boardman's, who lived for three years in "central New Brunswick," reported (Adams, 1873: 165) finding a nest with three eggs about the middle of January, 1868, and another nest brought to him some weeks earlier. He described a nest as made of black moss, birch bark, and twigs, and lined with moss and wool; the eggs were bluish white with red streaks on the larger end. He once caught 30 crossbills alive, using a hair noose, and one captive laid an egg in a cage. As Boardman and Adams wrote of eggs found early the same year, they may have been referring to the same find, or the species nested in more than one locality and Boardman got his eggs elsewhere. At any rate, I find no evidence that he got them in Maine.

Several times, in the state, birds have been seen paired, with males in song, when birds in the streaked juvenal plumage were also present. This may indicate that two broods sometimes are raised in fairly rapid succession. Like *L. c. minor,* the present species, after breeding in a locality, may not breed or occur there again in any numbers for months or years, and it too apparently occurs in flocks when breeding. I find no data on incubation and fledging periods.

Ecology. See Ecology under *L. c. minor.* There may be some slight difference in feeding habits of the two crossbills, as the White-winged Crossbill is reported more often opening hemlock cones in Maine.

Regarding habits at Westbrook, Cumberland County, early in 1900, Norton (1904a: 4) wrote: "During this visitation one or a pair was

often seen in larch and arbor vitae trees by our windows where their feeding habits could be easily watched. When the small cones broke from their supporting branch, under the force of the birds' operations, they were seized in its claws and held while the bird searched between the scales for seeds and even insect matter; when satisfied, the cone was dropped. Where a flock is feeding the patter of falling cones is audible for a short distance, and they often bear mute testimony to the scene of a recent feast as they lie thick under the trees. A small amount of insect matter was found in some of the stomachs collected in January."

Remarks. The White-winged occurs in greater numbers than does the Red Crossbill.

At the following times, this species was reported present in noteworthy numbers in at least a limited area (unless otherwise stated): 1850–51, abundant at Bethel, Oxford County, in winter (T. M. Brewer, 1854: 42); 1877, abundant at Acton, York County, in August (Smith); 1882–83, numerous in Cumberland County in winter (N. C. Brown); 1886, fairly common and breeding in the Umbagog region in February (Brewster *in* Griscom, 1938: 532); 1889, rather numerous in Cumberland County from January 1 to March 11 (Norton, 1904a: 4); 1899, country "flooded with them" at Umbagog from September 22 on (Brewster *in* Griscom, 1938: 532); 1899–1900, a heavy flight from November 10 to December 16, with lesser numbers into February, at Seguin (Spinney); 1900, abundant west of Seguin in Cumberland County from January 13 to March 10 (Norton, 1904a: 4), and 1906–07, fairly numerous in the same area (Norton); 1922, many small flocks in northern Maine throughout the year (Kilburn, 1923: 36), and in fairly large numbers, increasing in fall, in southern Maine (several observers); 1934, common on Mt. Desert Island early in the year (Stupka); 1935, present in numbers at the same place until at least October (Stupka) and common in fall at several inland localities (several observers); 1938–39, common to locally abundant throughout, beginning in August and continuing into April (several observers); 1940, fairly numerous coastwise in summer (several observers); 1941, fairly common at several widely separated localities in January and February (several observers); sizeable flocks coastwise from Sagadahoc County eastward in July and August (several observers); 1947; numerous on Mt. Katahdin in August (R. T. Moore); and 1947–48, many wintered in Somerset and Piscataquis Counties and bred in early 1948 (Palmer).

Birds observed at Southport, Lincoln County, from July 20 to August 17, 1901, had a song which "seemed much richer, louder and more prolonged than that of the Goldfinch—more like a Canary's

outpour with all the calls, trills, warbles and choppings" (Bates, 1901: 401). Weston saw about a dozen of these birds in Township 10, Range 8, Aroostook County, from August 4 to 20, 1942, in pairs and single males in spruces about the edges of bogs, and noted that their song was a trill, rather like a Canary's and much sweeter than a Junco's song.

Red-eyed Towhee

Pipilo erythrophthalmus erythrophthalmus (Linnaeus)

Summer resident, fairly common north to the southern end of Oxford County, to central Androscoggin, and to the eastern edge of Cumberland, and very local to the east up the Kennebec valley to the vicinity of Waterville, Kennebec County, and has occurred rarely as a *visitant* in spring, summer, and fall north to central Oxford and Piscataquis Counties and east into Washington.

Spring. This species arrives in York, Cumberland, and southern Oxford Counties from May 3 to 8, or perhaps rarely as late as the 12th. An early date is for one seen east of Cumberland County, on April 30, 1894, at Seguin (Spinney, 1903b: 52). It has been noted on Mt. Desert Island, where there are very few records, as early as May 9, 1936 (A. Brower), and on May 12, 1935, by Mrs. E. A. Anthony (Tyson and Bond, 1941: 73). Migration in Cumberland County apparently ends about May 22.

Fall. Migration occurs throughout September and to about October 5. Later dates are: October 5 to 10, 1935 (Mrs. E. A. Anthony), October 17 of unstated year (Stupka), and October 19, 1930 (Mrs. Anthony), all for Mt. Desert Island, and given in Tyson and Bond (1941: 73); October 24, 1947, at Waldoboro, Lincoln County (J. Keene); October 31, 1941, at Madrid, Franklin County (Mrs. C. A. Poole); and one seen on November 21, 1906, at Gardiner, Kennebec County, by Homer Dill (Powers, 1906a: 108). It is of interest that most of these late records are for places where the species has not been noted in summer.

Breeding. The nest generally is placed on the ground in a dry brushy place. The only Maine record I find is for one seen on June 16, 1940, under a ground juniper in a pasture at North Berwick, York County, by Norton. It was well sunken into the ground and built mostly of straw, being very similar to a Song Sparrow's nest. It contained three eggs. Outside of the state, incubation has been reported (*in* Forbush, 1929: 108) as 12 to 13 days, the male assisting. The fledging period apparently is unrecorded. Probably one brood only is raised yearly in Maine, although two sometimes are raised farther south.

Ecology. During summer, this species most often is found in small colonies in the black oak (*Quercus velutina*) areas in southern Oxford, York, Cumberland, Androscoggin, and Sagadahoc Counties. It also is found in other dry, rocky or sandy, brushy places in southwestern Maine, including areas where Pitch Pine (*Pinus rigida*) is the dominant growth.

In the period from about 1928 to 1934, at Brunswick, Cumberland County, a colony became established and increased to about 60 pairs. This was in a very wet, boggy area of acid soil covered mainly with various heaths, including blueberries, and small birches, and with a thick carpet of moss on the ground. There were large areas of standing water on the ground when the birds first arrived in spring, but later the area became very dry and hot. This colony since has diminished to only a few pairs, either because the birches are taller and more dense, thus shutting off considerable light from the ground, or because of decreased numbers of this bird in recent years.

Remarks. The breeding range apparently extends north to Fryeburg and Norway in Oxford County, to central Androscoggin, and, east of Cumberland County, very locally up the Kennebec valley to the vicinity of Waterville in Kennebec County. There may have been a colony at Boothbay, Lincoln County, for Montgomery (1890: 162) reported seeing a number of young birds there.

The species has occurred north and east of the breeding range in summer. Limits of such occurrence are: one seen on June 12, 1880, in the Umbagog region [? Me. or N. H. part] (Brewster *in* Griscom, 1938: 546); one at Madrid, cited under Fall; one seen on July 3, 1945, along Sandy Stream in Township 3, Range 9, Piscataquis County, and one on the 4th at Millinocket, Penobscot County (H. Johnson); one seen on unstated date in October, 1916, at Holden, Penobscot County (W. Hardy); one seen in July, 1920, at Machias, Washington County (Kilburn, 1922b: 117); and the several spring and fall records for Mt. Desert Island, cited under Spring and Fall.

In 1860, the Towhee was known to occur in summer and to be locally uncommon to common in parts of York County, at Norway in Oxford County, and from Portland westward and south of Sebago Lake in Cumberland County. Data at hand show that there was some increase in range and a decided increase in numbers since then, mainly after 1900, and there has been a marked decline in numbers since about 1941.

This species has been observed eating blueberries at Berwick, York County (Dr. Anne Perkins).

The March 17 report, for Westbrook, Cumberland County, by Norton (*in* Sweet, 1904c: 79), is a misprint for May 17 (Norton).

Ipswich Sparrow

Passerculus princeps Maynard

Transient, occasional in spring and uncommon in fall; two *winter* records. Practically all records are for occurrences on the beaches of York and Cumberland Counties, and Popham Beach and vicinity in Sagadahoc (see Remarks for the few others).

Spring. Of the few records at hand, for late March and early April, the earliest is for March 20, 1875, at Cape Elizabeth, as reported by N. C. Brown (1875 and 1882e: 190), and the latest for April 8, in 1896, one shot on Seguin (Spinney), and in 1940, one seen on Monhegan (Mrs. J. A. Townsend).

Fall. All occurrences except four are from October 24 to November 17. Earlier dates are: one on October 1 and two on the 3rd in 1947, at Scarborough (C. Whittle); and one on October 11, 1900, on Seguin (*in* W. Cooke, 1911: 44). The latest date is for a bird collected on November 27, 1916, at Scarborough, by Norton.

Winter. One bird, either a late transient or winter resident, was seen on December 8, 1946, at Popham Beach, by W. Drury. "On January 23 [1886], I found two Ipswich Sparrows in the beach grass about half-way between Pine Point and Old Orchard [=Grand Beach on the Cumberland-York County boundary]. I managed to secure them both" (Goodale, 1886). There is also the indefinite statement by Smith (1882–83: 466) that he had seen this sparrow "in December when there were several inches of snow on the ground and long after all the Savanna Sparrows had gone south."

Ecology. This is a bird of grassy sand dunes near sea beaches.

Remarks. Occurrences away from sandy beaches are those for Seguin (near Popham Beach), Cape Elizabeth (near Scarborough Beach), and Monhegan—all cited above— plus one for a bird taken on Little Green Island, Knox County, as reported by Rackliff (*in* Knight, 1908b: 402), a bird seen on March 27, 1916, at Maquoit Bay, Brunswick, Cumberland County, by Gross (Walch, 1926: 61), and one seen on November 11, 1945, at Petit Manan Point, Washington County (Weston). The Little Green Island bird, taken in spring, was examined by Norton.

The decrease in reports of this bird in recent years, at a time when there has been an increase in observers, correlates with the fact that the Ipswich Sparrow is known to be decreasing in numbers elsewhere. Even in former years, however, few occurred on Maine beaches, most transients undoubtedly passing by at sea between Massachusetts and Nova Scotia.

N. C. Brown (1877) believed he saw one of these birds on the "northwest shore of Lake Umbagog, in New Hampshire," but he later

(1896a) withdrew the record. In the meantime, it had been accredited to Maine. The March 20 occurrence at Cape Elizabeth, cited under Spring, twice has been misquoted as March 15 (Norton, 1904b: 44).

Eastern Savannah Sparrow

Passerculus sandwichensis savanna (Wilson)

Summer resident, very common on the coast, islands, and in some farming sections in central Maine, and fairly common elsewhere; *transient,* numerous in spring and fall. The few *winter* records are for birds of undetermined subspecies.

Spring. Average arrival dates are about April 8 in Cumberland County, about the 14th at Bangor, and the 20th at Presque Isle. The peak of migration in Cumberland County extends from about April 18 to May 1. Spinney noted flights as late as May 15, 1901, at Seguin.

Fall. Migration occurs mainly from September 15 to October 25. Although Spinney saw a few birds about the light on Seguin in very early September in different years, the earliest date for any number is September 11, 1895. The peak of migration in southwestern Maine usually occurs through the last week in September and to about October 13, although many flocks are present in some years to about the 23rd. The few occurrences for October 25 to November 13 are all for coastal Cumberland and York Counties, except for one bird reported seen by Mrs. P. Hannemann, on November 5 and 7, 1945, at Hampden, Penobscot County.

Breeding. Nests are located in fields, meadows, salt marshes, and grassy slopes on islands. A tendency to hide the nest in a shady tussock of grass is carried still farther when nests are built under the edges of driftwood in salt marshes along the coast. A hollow is dug in the ground or in a tussock, and in it both birds construct the nest of grass, sometimes adding a thin lining of rootlets or hair. Five eggs generally are laid. Brewster (*in* Griscom, 1938: 537) reported finding a nest, completed on May 15, 1896, in the Umbagog region, that contained two eggs on the 21st, and four were collected from it on the 26th. First clutches usually are completed from May 26 to mid-June, with most dates for many fresh sets from Brewer, in the Harris collection, being from June 5 to 8. Incubation requires 12 days and fledging about 14. The reproductive cycle is repeated, usually starting the second or third week in July, a second brood being reared. The latest hatching date is August 3, 1895, as observed by Norton at Westbrook, Cumberland County.

Winter. The only record between November 13, cited under Fall, and December 11 is for a crippled bird taken on November 24, 1898,

on Big Green Island, Knox County, and recorded by Norton (1904b: 45). One was seen on December 11, 1938, and another on the 26th, 1941, at Scarborough (Norton); one was taken on January 24, 1897, at Seguin, where it had been seen for two weeks (Spinney *in* Powers, 1897d); and on February 9, 1908, one was seen at Scarborough, and another at Old Orchard Beach, York County (Norton, 1908c). (See Remarks.)

Ecology. On the coast, the breeding population is most dense on grassy islands, drier parts of salt marshes, and fields having a rank growth of grass. Inland, the species is somewhat local in summer, being found most often in moist hayfields, meadows, the sides of gullies, and in other damp places. In August, after nesting is ended, hundreds of these birds often are found in a small area of salt marsh. These are mostly young of the year, that linger in these areas of adequate food and shelter before flying south.

Remarks. The account of this bird as here given does not distinguish between subspecies. Because the migration and winter data are based largely on sight records, what portion of these data actually refer to the Labrador race (next discussed) is unknown.

Labrador Savannah Sparrow

Passerculus sandwichensis labradorius Howe

Two records. A male, collected by Brewster on September 24, 1890, on the Maine side of Lake Umbagog, is in the collection of the Boston Society of Natural History (Peters and Griscom, 1938: 453; Griscom, 1938: 538). In a letter to me, dated May 29, 1933, Norton stated that he had examined the series of Savannah Sparrows in the Portland Society of Natural History, finding one specimen of the present subspecies. "It was taken in this region [Cumberland County] in fall."

Remarks. This bird probably occurs regularly coastwise in spring and fall. See Remarks under *Passerculus sandwichensis savanna.*

Eastern Grasshopper Sparrow

Passerculus savannarum pratensis (Vieillot)

Summer resident, about two pairs breeding annually at Berwick, York County; has occurred once as a *visitant* in Cumberland, Kennebec, and Somerset Counties, and perhaps more than once in Washington.

Migrations. This species has been seen as early as May 16, 1938, and

May 26, 1941, at Berwick, by Dr. Anne Perkins. The latest date at hand for fall is October 4, 1940, at Berwick (Perkins).

Breeding. "For over forty-five years, to my certain knowledge, at least two pairs of these birds have nested annually on our farm in Berwick" (Perkins, 1935). A letter from Dr. Perkins, dated October 7, 1946, indicates that their status has continued the same. No nest has been found, although Norton hunted for them at Berwick more than once. The males generally remained in song until the third week in June; fledged young have been seen the first week in August. Outside of Maine, this species has been found to dig a depression in the ground and build in it a nest of grass, the site being well concealed in a dry field or pasture. Three to five eggs are laid. Apparently little is known about the breeding habits of this sparrow.

Remarks. Aside from York County data, all known occurrences in the state, listed chronologically by year, are as follows: "Summer visitant. Rare. Arrives the first of April" in the Calais region (Boardman, 1862: 126), and Smith (1882–83: 466) stated that Boardman "informs me that he has procured two specimens," but it is not certain whether they were taken at Calais or across the line in New Brunswick; one seen on June 8, 1901, at Pittsfield, Somerset County (C. H. Morrell, 1902), and one on June 27 to 29 of that year at Westbrook, Cumberland County (Norton, 1904b: 46); one seen on June 11, 1902, in Unity Township, Kennebec County (Swain, 1902a: 40); and one seen in late May of unstated year at Lubec, Washington County, by Clark (*in* Knight, 1908b: 408). There is a typographical error in the dates as published, in this latter record, the bird reported as having been seen from May 24 to 22!

This bird first was accredited to Maine by Audubon (1834: 180), who unquestionably was in error in stating that it occurred from Maryland to Maine in considerable numbers.

An extralimital record of interest is for a young male, taken October 1, 1930, at North Head, Grand Manan, New Brunswick (A. Brooks, 1933: 71).

Acadian Sharp-tailed Sparrow

Ammospiza caudacuta subvirgata (Dwight)

Summer resident, very common in a few salt or brackish marshes in Sagadahoc, Waldo, Hancock, and Washington Counties, and apparently rather rare in Lincoln and Knox; *transient,* probably common coastwise in spring (although generally overlooked), and abundant in fall, especially in Cumberland and York County coastal marshes.

Spring. Migration probably occurs from about May 20 into early June, but few data are at hand. May dates include the 21st, in 1903, for a male taken at Lubec, Washington County (Clark *in* Norton, 1904b: 47), the 22nd, in 1897, for a male taken at Scarborough (J. L. Peters, 1942: 205), and the 31st, in 1941, for one seen at Petit Manan Point, Washington County (Norton). Males were in full song on June 9, 1924, on the marsh at Popham Beach, Sagadahoc County (Norton), and at the same place on June 10, 1939 (Montagna, 1940: 191).

Fall. Apparently there is some premigration wandering, the southward movement occurring from the middle of September throughout October and most noticeable from the first to 24th of the latter month. There are many records, both specimen and sight, for the period from September 17 to October 31 at Falmouth and Scarborough in Cumberland County, almost all by Norton, also a female in juvenal plumage was collected at the latter place as late as November 15, 1877, by N. C. Brown. This late specimen was identified to subspecies by Dr. Jonathan Dwight. There are many September and a number of October records for farther eastward, within the breeding range, the latest two being for a bird caught by a cat on October 21, 1933, near Indian Point on Mt. Desert Island, as reported by Tyson and Bond (1941: 73), and several seen on October 27, 1921, at Popham Beach (Norton).

Breeding. Norton (1927) described a nest found on June 24, 1926, in the wetter part of the extensive salt marsh at Popham Beach. It was suspended by its sides from the culms of *Spartina alterniflora*, with its bottom about two centimeters above the wet ground. The nest was made of blades of *S. alterniflora* and culms of *S. patens*, the lining being of fine blades of the latter. The four eggs were about one third incubated. Earlier dates for eggs taken, in Waldo County, are: a set of four fresh on June 18, 1941; two sets of four, advanced in incubation, on June 22, 1941; and one set of five fresh the same day (Harris). R. F. Miller (1941: 135) mentioned a nest and fragment of egg shell found on July 3, 1941, on Mt. Desert Island, where the nest had been washed out of its site by the tide. The locality was the marsh at Bass Harbor (Bond).

Incubation is by the female (Norton, 1897a: 100); the period apparently is unrecorded. According to H. F. Lewis (1920b: 588), both parents feed the young, as he observed at Yarmouth, Nova Scotia, where he found partly feathered young in a nest as early as June 12, 1920. As late as August 7, 1896, when there were flying young at Popham Beach, males were still in full song (Norton, 1897a: 100). This might indicate that (1) a second brood is raised, or (2) unusually high tides had defeated the earlier attempts of some birds' nesting. The fledging period apparently is unrecorded.

Ecology. From Popham Beach eastward into Washington County, this bird is found in summer in wetter portions of salt marshes that, cut by tidal creeks, are flooded with an inch or two of water during ordinary high tides. The dominant plant in such areas is usually *Spartina alterniflora.* This habitat is too wet for Savannah Sparrows to nest in, but they often are abundant on higher ground in the same marshes. A photograph of the Sharp-tail habitat at Popham Beach appears in an article by Montagna (1942: 114). Some of the Washington County marshes where this bird breeds are more brackish than salt. For a comparison between the summer habitats of *A. c. subvirgata* and *A. c. caudacuta,* see Ecology under the latter subspecies, which follows.

In the fall migration, in Cumberland and York Counties, these birds are found in somewhat drier, as well as the very wet portions, of salt marshes and often where plant life is taller and more dense than is characteristic of breeding areas.

Remarks. At Popham Beach, the western limit of the breeding range of this subspecies on our coast, a series of birds was taken in June, 1939, by Montagna and myself. Typical examples of *subvirgata,* intermediates between it and *caudacuta,* and one typical example of the latter were in this series (Montagna, 1940: 193–194). (See Remarks under *A. c. caudacuta.*)

Montagna (1940) has described the sexual fighting of the present species, and given other data on habits. Included also (ibid. 195) are weights and measurements of 26 birds; 21 males weighed 17.4 to 20.9 grams (average 18.3), and 5 females 16.4 to 21.2 (average 18.1).

The series reported shot by Montgomery (1890: 162) were later reidentified by him, correctly, as Savannah and Song Sparrows (Witmer Stone).

Intermediate Sharp-tailed Sparrow

Ammospiza caudacuta caudacuta (Gmelin)

Summer resident, common in salt marshes in York and Cumberland Counties, reaching its eastern limit (except for one June specimen from Popham Beach, Sagadahoc County) at Scarborough.

Migration. No data. See Remarks.

Breeding. No nests have been reported. They should be sought at Kittery and Wells in York County, and at Scarborough, where this bird has been found in the breeding season. The little that is known of breeding habits, as noted outside of Maine, indicates that this subspecies is very similar to the Acadian, discussed previously.

Ecology. Norton (1897a: 100–101) compared the summer habitats of *A. c. caudacuta* and *A. c. subvirgata* in the state as follows: "From

Scarboro southwardly co-extensive with the range of *caudacutus* the coast stretches in a low terrace of sandy beaches and salt marshes, unbroken by Laurentian features. North of Scarboro, beginning with Cape Elizabeth, its eastern boundary, the coast presents an uneven or hilly face of rocks, indented with coves and bays, studded with dry ledgey islands. Between the hills are innumerable arms of the sea often extending as 'tide rivers' or fjords several miles inland, bordered by narrow swales rather than broad expanses of marsh. Coincident with these features is the low spruce woods, so conspicuous a feature of the Maine coast, so characteristic of the scanty soiled granite ridges, and the fog drenched coast of the northeast. Within the confines of this region only has *subvirgatus* been found breeding, and it is here noteworthy that the birds found at Small Point [=Popham Beach], though on the salt marsh, were in close proximity to granite ledges, and hills clothed with 'Black spruce,' gray mosses and lichens. Very different in appearance are the broad marshes of Scarborough and western Maine, backed by soil-clad verdant slopes, with pine and hardwoods replacing the spruce."

Remarks. Dates for spring and fall occurrences are all based on sight records made years ago. I do not consider them reliable, for, during migrations, the Acadian greatly outnumbers the present subspecies, and distinction between the two in the field is difficult.

A female of the present race, having enlarged ovary and swollen brood spot, was collected on June 25, 1939, in the marsh at Popham Beach (Montagna, 1940: 194). All other known breeders collected there were typical Acadian or intermediate in characters.

In summary, the race *caudacuta* breeds as far east as Scarborough, *subvirgata* breeds as far west as Phippsburg (only a few migrants having been known from the intervening 35 miles where there are few marshes), and *nelsoni* is known only from Cumberland County as a transient. These facts were outlined by Norton (1897a) and almost nothing, except confirmatory data, has been added to our knowledge of their status in the years since. It would be advisable, however, to carefully reexamine all Sharp-tail specimens in the collection of the Portland Society of Natural History. There are a very few sight reports of migrant Sharp-tails at inland localities which I have not seen fit to record; such birds should be collected.

Nelson's Sharp-tailed Sparrow

Ammospiza caudacuta nelsoni (Allen)

Rare *transient* in spring and fall, known only from Cumberland County.

Spring. One was taken on May 22, 1897, and other seen on June 5th, at Scarborough (Norton, 1904b: 46). On May 30, 1929, I collected a female at Maquoit Bay in Brunswick, and Norton identified it as *nelsoni*.

Fall. A female in juvenal plumage, taken on September 13, 1882, at Scarborough, is number 3832 in the N. C. Brown collection in the Portland Society of Natural History (Norton). "In fall I have taken unquestionable specimens between the dates of October 9 and 16, inclusive, while intermediates have been taken as late as October 25" (Norton, 1904b: 46).

Remarks. Although J. L. Peters (1942: 208) stated that he knew of no spring records of *nelsoni* on the Atlantic coast north of Staten Island, New York, I am not aware that he examined spring specimens referred to this race by Norton, in the collection of the Portland Society of Natural History. These need reexamination to determine whether some may be examples of the race *altera* which Todd has described.

Seaside Sparrow

Ammospiza maritima subsp.

One specimen, an immature male, was collected on August 18, 1884, on Shark Rock, Knox County, in outer Muscongus Bay (Smith, 1884; Norton, 1904b: 47). This specimen, in juvenal plumage according to the detailed description in Norton's files, is number 2940 in the collection of the Portland Society of Natural History.

Remarks. I was unable to locate this specimen in a brief search early in July, 1947. This bird could hardly be anything but *A. m. maritima,* the subspecies occurring nearest to Maine. Attwood (1946: 87), however, listed it as "*Ammospiza maritima peninsula*" [sic] in his Maine gazetteer. He writes me that this was an error.

Eastern Vesper Sparrow

Pooecetes gramineus gramineus (Gmelin)

Summer resident, fairly common in Kennebec and Androscoggin Counties, uncommon and rather local elsewhere inland, and rare near the coast and probably on a few larger islands; *transient,* fairly common in spring and fall throughout, except uncommon on islands.

Spring. This species arrives at Portland from April 1 to 12, averaging about the 10th. An exceptionally early date is for March 2, 1896, when one was heard singing at Gardiner, Kennebec County, as reported

by Larrabee (*in* Knight, 1896d: 20). The species was seen as early as March 26, 1922, at Brunswick, Cumberland County (Walch, 1926: 61), April 1, 1905, at Skowhegan, Somerset County, and April 9, 1905, at Avon, Franklin County (*in* Sweet, 1906b: 37). It arrives at Bangor, Brewer, and Orono, in Penobscot County, from April 10 to 15, rarely by the 5th. It has been seen as early as April 13, 1945, at Presque Isle, where it generally arrives about the 22nd (Chamberlain). Spinney found the species to be an abundant migrant on Seguin in the last two weeks of April. His latest dates for sizeable flights are April 24, 1898, and April 28, 1901, the last date for a small flock being May 2, 1898.

Fall. Early in September, this species begins to appear on islands where it does not breed, probably in a premigration dispersal movement. Spinney first noted "many" on Seguin on September 16, 1897, recording "numbers" on the 29th, and "hundreds" on the 30th. Most migrants are seen from October 8 to 24, and the species generally has departed from northern and eastern areas by the latter date. There are several records for November 1 to 9 in Cumberland County by Norton, who also saw one on the 12th in 1910, at Gouldsboro, Hancock County. Very late dates are for single birds seen the week of December 3, 1939, on Monhegan (Mrs. J. A. Townsend), and one seen on December 25, 1934, at Back Cove in Portland (Norton).

Breeding. The nest is placed in a slight depression in the ground, or in a clump of grass or weeds, in dry fields, weedy gardens, or similar places having rather sparse vegetation. It is made of grass and rootlets, with a lining of fine grass. Knight (1908b: 401) stated that he believed the male and female both worked on the nest, and that building required seven to 14 days. He also stated that three to five, usually four, eggs make a clutch, but records at hand are for three except for two of four.

The first set usually is completed the last week in May, and the second during the third week in July, but fresh sets are found throughout the intervening period. Earliest is for a set of four, in the U. S. National Museum, that were fresh when collected on May 15, 1901, by C. H. Morrell at Pishon's Ferry in Clinton, Kennebec County. Latest is for a set of three, in Norton's collection, taken on August 3, 1888, at Gorham, Cumberland County. Knight (ibid.) stated that incubation required 11 to 13 days, and that he believed the male assisted in this, as well as feeding the young that were fledged in about 15 days. Norton saw fledged young as early as June 18, 1904, at Westbrook, Cumberland County. Two broods are raised in a season (Norton, 1904b: 44; Knight, 1908b: 401).

Ecology. The following remarks by Norton (1904b: 44), written at a time when this species was much more numerous in the state, describe

the summer habitat: "This species is of general distribution throughout the state. However it is rather uncommon on much of the coast and nearer islands, and absent from the outer islands. On the rocky foot hills of York County I have found it to be the characteristic finch, abounding in pastures, where it places its nest, sheltered by a bush, weed, or stone.

"On the more level and grassy fields of certain parts of Cumberland County, and indeed in similar localities in York County it is less abundant, giving place to Savannah Sparrows and Bobolinks.

"In late summer it becomes a characteristic feature of the roadside in much of the state's area."

Remarks. This bird formerly was the characteristic sparrow of dry grassy hillsides in summer, as mentioned above. A marked decline in numbers has occurred and, according to Norton's notes, the summer of 1918 was the last in which this bird could be called numerous in Cumberland County. The decline has continued there to the point where one has to know an area fairly well and go to certain favored localities to find breeding birds. Their numbers seem to have been more constant in counties farther inland. For the Calais region, Boardman (1862: 126) found this bird common in summer, and later (1903: 304) abundant. This trend has been reversed, however, for Bond (1947a: 10) wrote: "Ten years and more ago I invariably recorded this conspicuous bird on my June 'lists,' but of late have rarely seen it in the State, except during autumnal migration. In Hancock and Washington County the Vesper Sparrow is now a very rare, perhaps merely a casual, summer resident." He suggested that, as there is little suitable summer habitat in New Brunswick, the transients seen in Maine most likely find suitable breeding grounds in the St. Lawrence River valley.

Although Carpenter (1886b: 146) mentioned a report of this bird wintering in the Dead River region, it is obviously an error. Bond has stated in a letter that the report of a nest found on Town Hill on Mt. Desert Island, published in Tyson and Bond (1941: 73), probably pertains to the Junco.

Eastern Lark Sparrow

Chondestes grammacus grammacus (Say)

Occasional *visitant* (August 7 to September 10), there being about 13 known occurrences (1913 to 1946) in the coastal counties of York, Sagadahoc, Lincoln, Knox, Hancock, and Washington.

Records. All known occurrences are here listed chronologically by year: total of "two or three" seen on August 25, 1913, and August 16

to 29, 1917, by R. F. Cheney, on Monhegan (Forbush, 1929: 68); one seen each day, September 9 and 10, 1918, on Monhegan (Dewis, 1919: 35, 40); one seen on August 12, 1925, at Matinicus, Knox County (F. H. Allen, 1926); an immature male trapped and banded on August 26, 1930, at Mt. Desert Island, by Mrs. E. A. Anthony (Tyson and Bond, 1941: 73); one seen from August 8 to 13, 1934, at Richmond, Sagadahoc County (R. Verrill, 1935); two seen and one of them (female) collected on August 20, 1936, on Appledore Island, York County (P. L. Wright, 1937b: 547); a female seen on August 14, 1938, at Petit Manan Point, Washington County (McClanahan, 1940), and one seen the same day on Monhegan (Mrs. A. Cruickshank, and others); one seen on August 7, 1939, at Muscongus, and another on the 11th, 1941, at Medomak, both in Bremen, Lincoln County (Cruickshank); one seen from August 9 to 11, 1946, at Cape Rosier, Brooksville, Hancock County (M. and R. Emery); and one seen on August 29, 1946, at Thomaston, Knox County (J. Creighton).

Remarks. In recording the Appledore Island specimen, P. L. Wright (1937b: 547) stated: "There have been several previous sight records and a banding record, but this is the first record based on a collected specimen." This statement apparently referred to the Isles of Shoals collectively, some of which are in New Hampshire.

On dates ranging from August 13 to October 3, six individuals (four collected) have occurred on Grand Manan, New Brunswick (Pettingill, 1939a: 370). Although A. Brooks (1933: 71, 72) believed that three of these specimens were of the western race *strigatus*, J. L. Peters reports that Wright's Appledore Island specimen is of the eastern race, to which I have referred, tentatively, all Maine records.

Northern Slate-colored Junco

Junco hyemalis hyemalis (Linnaeus)

Summer resident, common from northern York and extreme eastern coastal Cumberland County northward and eastward throughout, including islands, and numerous at higher elevations in the interior; *transient,* numerous in spring and fall; *winter resident,* uncommon and local, or perhaps absent in some years.

Spring. Birds arrive in Cumberland County about March 14 to 20 (rarely by March 8), with the first large flight about April 1. Arrival dates for Presque Isle range from March 22 to April 11 (Chamberlain). If the season is advanced, a sizeable wave may arrive early, as in 1935 when the species was abundant eastward to Mt. Desert Island by March 17. In southwestern counties the number of migrants begins to diminish after about April 21, the last flocks being noted in early May.

Fall. Small flocks appear regularly in Cumberland County by the middle of September. The main migratory movement begins the first week in October and continues to November 6 or later, depending on the season, and usually is completed there by November 21.

Breeding. All of about a dozen nests that I have seen have been in little cavities in the bank along wood roads and in the sides of mossy, rotting logs, where the nest was protected from above by overhanging earth, moss, or other vegetation. Knight (1908b: 426) reported similar sites, also under upturned tree roots, in tufts of bushes or shoots on the ground, or in low growth in the middle of abandoned wood roads. Norton (1904d: 54–55) wrote: "Sometimes placed under brush by roadside, often well under the side of an inclined rock, or within a recess in a steep ledge, they have been built of fine grasses and well lined with cattle's hair, the finish being so perfect that they had a highly polished appearance; beautiful as these have been, richer still were a few well within spruce woods, built in beds of green moss, beneath canopies of the beautiful and fragrant crowberry (*Empetrum nigrum*), where it had crept across low spruce limbs." Knight (op. cit.) stated that nests are made of dry grasses, and lined with finer grasses and hair when available. Feathers also are added quite often.

There are data at hand for nearly three dozen clutches, practically all being of four eggs, with two of three and one of five. Norton (1904d: 55) stated that "some pairs frequently have finished laying during the first week in May." This probably is the basis of Knight's statement (1908b: 426) that clutches sometimes are completed as early as May 1. The earliest record at hand is Norton's, for five eggs found on May 7, 1882, at St. George, Knox County. Generally, first sets have been taken in various stages of incubation from May 21 to June 8.

Outside of Maine, incubation has been reported (*in* Forbush, 1929: 86) as 11 to 12 days. I do not find the fledging period recorded. A second brood is raised, the eggs being laid from late June to late July. Norton (op. cit.) stated that "young just out of the nest are numerous in August." Young were still in a nest on August 25, 1877, on Harbor Island, off Friendship, Knox County (Hardy).

Winter. Most winter records are for coastal counties. "I have found very few Juncos inland after severe weather sets in" (Mendall). Mid-winter records for inland counties include two birds that visited Chamberlain's feeding station at Presque Isle in February, 1942. Some winters, apparently all Juncos leave the state, even from coastal counties, and in others, singles, pairs, and small groups remain.

Ecology. In summer the Junco is a bird of coniferous or mixed woodlands, not so much the mature growths as where there are openings

and small trees, and often where there are patches of moss on the ground. "The Juncos, which usually choose to nest at a considerable altitude, to obtain the coolness they enjoy, have found that they can obtain the desired temperature in ice-houses, and their nests may often be found there" (Hardy, 1896b: 113). This applied to Brewer and vicinity where ice-houses were built in cool woods. Southwesterly, the limit of the summer range is found to coincide with the limit of spruce stands, on Casco Bay islands, on Cape Elizabeth, and in northern York County. In migration and winter, this bird generally is seen in weed patches and old fields, not far from protective cover, such as bushes or trees. It is social and gregarious, perhaps the most common associates being White-throated and Tree Sparrows.

Remarks. There are many sections of the state, inland and at some elevation, where either this bird or the White-throated Sparrow, depending on local conditions, ranks first in numbers in the breeding bird population.

Shelley (1931: 171, 172) mentioned a bird having white wing-bars that was banded by Mrs. Anthony on November 11, 1930, at Bar Harbor, Mt. Desert Island; apparently it was an abnormally colored bird of this species.

Oregon Junco

Junco oreganus subsp.

Hypothetical. One was reported seen "for several days" in the second week of December and again on the 21st "for a day or two," in 1947, at Camden, Knox County (Adams *in* Dana, 1948b: 32).

Eastern Tree Sparrow

Spizella arborea arborea (Wilson)

Transient, numerous in spring and fall throughout; *winter resident,* varying in different years from common throughout to uncommon or even absent over sizeable areas.

Fall. This species usually arrives in northern Maine from October 8 to 14, and in the Portland region about the 20th. Two very early records, that may be questionable, are for occurrence on September 26, 1892, in "southern Maine," as reported by W. Cooke (1909: 254), and a few seen in the period September 27 to October 10, 1887, on the Penobscot River above Moosehead Lake (Carpenter, 1887). The earliest reliable southern Maine record is for a few seen on October 13, 1925, at Georgetown, Sagadahoc County, by Norton. Migrants reach maximum numbers in southern Maine the last week in October, and no

marked decrease is noted until about November 21. The movement apparently ends early in December.

Winter. Although some writers have attempted to show that this bird is a winter resident in the southern parts of the state only, published records and extensive unpublished data show that the species occurs throughout the state, though numbers vary from winter to winter and throughout the season. Flocks of five to 12 birds usually are reported, and up to about a hundred sometimes are seen.

Spring. In southwestern Maine, numbers increase the second week in March and continue high from then until about April 14. At Presque Isle, Chamberlain first has noted migrants on dates ranging from April 7 on, which indicates, perhaps, a rather slow northerly drift at this stage of migration. The species decreases rapidly in numbers from April 15 to 23 in Cumberland County, after which few are seen. I find no definite May records for the county, although N. C. Brown (1882f: 14) said it was not seen in Portland "after the first week of May." Uncommonly, it lingers at inland points until May 4, and rarely until the 9th. Latest dates are: May 16 occurrence for unstated locality and year (*in* G. M. Allen, 1909: 160), and May 16, 1947, at Orono, Penobscot County (F. Dean).

Ecology. In migration and winter, this bird is found in habitat very similar to that occupied by the Junco, although somewhat more open. (See Ecology under Slate-colored Junco.)

Remarks. Audubon (1834: 512) wrote that he had reason to believe that the Tree Sparrow bred in northern Maine. This statement may have influenced Boardman (1862: 127) in stating that, in the Calais region, this species was a "Summer visitant. Common. Arrives from middle to last of March. Breeds very early." Later, however, Boardman (*in* Knight, 1897d: 99) stated that it occurred only in migration in Washington County.

A great amount of available data notwithstanding, Knight (1908b: 420) gave the time of fall arrival at Bangor as usually "in early September, generally about the fourth." He also gave himself as authority for occurrence of the species in early August at Fort Kent, Aroostook County. This would seem extremely doubtful, as is certainly Beckett's statement (*in* Norton, 1909g: 102) that considerable numbers arrive in Portland toward the latter part of August.

Eastern Chipping Sparrow

Spizella passerina passerina (Bechstein)

Summer resident, very common in settled areas throughout, including some of the larger islands, and uncommon elsewhere; *transient,* numerous in spring and fall; one *early winter* record.

Spring. This species generally arrives in Cumberland County April 22 to 24, although there is much variation in dates. There are nine earlier Maine records, the four earliest being: April 2, 1904, at East Hebron, Oxford County (Johnson *in* Sweet, 1905c: 62), the same day in 1917 at Brunswick, Cumberland County (Walch, 1926: 61), and in 1945 at Hallowell, Kennebec County (Mrs. A. Grover); and April 8, 1897, at North Bridgton, Cumberland County (Mead *in* Powers, 1897g). There are three April 11 dates for southwestern Maine. Arrival dates at Presque Isle range from May 2 to 9, an early date being April 19 (Chamberlain). The earliest Hancock County date is for six seen on April 24, 1942, at Surry, by Weston. In southwestern Maine, migration does not reach a peak until late in the second week of May, and apparently ends the last week.

Fall. Migration begins by the middle of September, if not earlier, and is nearly over by October 25. There are 11 November dates at hand, apparently all for birds of the year. The latest ones, by Norton, are November 16, in 1898 at Westbrook and in 1939 at Brunswick, both in Cumberland County, and one on November 18 and 21, 1939, at Isle au Haut.

Breeding. "The nest is almost always placed in bushes, trees, vines and shrubbery about gardens and orchards, along highways and in pastures, but I once found a nest on the ground containing four eggs. I have found nests in the following situations: apple, pear, spruce, fir, maple, cedar, elm, hemlock, hackmatack, poplar, willow, birch and alder trees and in honeysuckle and woodbines. The general preference with us seems to be a cedar hedge or a roadside hackmatack, spruce or fir tree or an apple tree in an orchard. The height of the nests varies from five to fifteen feet, generally about ten to twelve feet.

"A typical nest . . . was composed of very fine grass stems and weed stems, lined with fine rootlets and horsehair. Most nests are lined with horsehair or if these are not available with fine rootlets. . .

"The usual number of eggs laid is four, but many sets consist of only three and very rarely five are laid. . .

"Nest building begins about May tenth to fifteenth and a nest is completed in five to twelve days according to circumstances, and the same spot used the previous year or some place near by is selected usually. The male occasionally helps (rarely however in most instances) build the nest and does a small proportion of the work of incubation. He faithfully helps feed the young however. The eggs hatch in from ten to twelve days and the young leave in twelve days more. A second brood is always reared, the eggs for this being laid in early July" (Knight, 1908b: 422–423).

There is little that one can add to Knight's account. Eggs for the

first brood are laid in late May and early June. Samuels (1865: 423) reported finding nests "in low juniper bushes in the deep woods" (perhaps in yew, in Oxford or Franklin Counties where he visited). Swain (1899a) reported a ground nest under a low apple tree limb, also that the young probably can fly at 12 days, but leave the nest several days earlier. Robinson (1927a: 43) reported that a pair at Brewer laid six eggs beginning June 8, incubated them 11 days, and the young were fledged in ten days (July 2); they had three eggs in a second nest on July 20, two hatched July 29-30, and the young left August 7-8.

Winter. One was seen on December 26, 1940, on Mt. Desert Island, by several observers (Tyson and Bond, 1941: 73).

Ecology. The Chipping Sparrow is a bird of sheltered openings, field edges, and lawns. Being a ground feeder primarily, it is not adapted to windy outer islands where there are either barren rocks or rank herbage. Occasionally it is seen in open hardwoods or mixed woods, but seldom far from roads or clearings. Speck (1921: 368) translated its Penobscot Indian name as "little garden bird," implying that it occurred in cleared areas such as campsites.

This sparrow is gregarious and social, small numbers being seen in migration in company with many other species of small birds. On urban lawns in summer, quite often one sees an English Sparrow or two following a bird of the present species, the latter apparently taking the initiative in finding food.

Remarks. There are local fluctuations in population, the causes for which are unknown. Hardy (1881) once reported the species becoming scarce at Brewer, but it now is common there.

Well into the summer of 1882, the weather was so cold in Maine that people were obliged to wear winter clothes. On June 12 of that year, at Brewer, Hardy found a Chipping Sparrow dead on its nest, apparently having chilled to death while incubating.

Eastern Field Sparrow

Spizella pusilla pusilla (Wilson)

Summer resident, breeding in small colonies in southwestern Maine to central Oxford, southern Franklin, northern Kennebec, and western Sagadahoc Counties, also near Bangor, and has occurred as a *visitant* in spring or summer to north-central Oxford, southeastern Somerset, and southern Piscataquis Counties, and southeast to Mt. Desert Island and Washington County.

Spring. This sparrow usually arrives on its breeding grounds from April 16 to 22, occasionally later, and was once reported as early as

April 14, 1897, at Lewiston, Androscoggin County, by W. Cooke (1909: 258). Migration is known to continue to May 8, and probably ends by the middle of the month.

Fall. There is some movement by the first week of September, birds being noted at places where they were not seen in summer. Migration definitely begins by September 13, is most noticeable late in the month and early in October, and ends by October 19. A possible later date is for several birds seen the "week of October 22," 1939, on Monhegan, by Mrs. J. A. Townsend.

Breeding. The nest site, in bushy pastures and old fields, is in "low shrubbery, blueberry, juniper and bramble" (Norton, 1904d: 54). The nest, usually off the ground, is constructed of grasses, weeds, and generally some leaves, and lined with fine grass or hair. Usually four or five eggs make a clutch. Smith (1882–83: 484) stated that sets of four eggs were laid in May and June. Specific dates are: two sets of five, found on June 1, 1902, at Westbrook, Cumberland County (Norton); four eggs on July 11, 1924, at Greene, Androscoggin County (Mendall); and three on July 15, 1887, in a blueberry bush at Gorham, Cumberland County (R. Norton).

In Michigan, Walkinshaw (1945: 14) found that incubation required 11 or 12 days, that the young remained in the nest an average of 6.8 days, that the male fed early broods as long as 35 days, the female only 18, and that the male fed later broods for a shorter period.

Smith (op. cit.) stated that two broods are raised yearly in Maine.

Ecology. "They are distinctly birds of old bushy fields and pastures where the territory is rather open, spotted with bushes here and there. Here in spring and summer the characteristic clear, whistling song may be heard, one bird answering another . . . for they usually occur in small, locally scattered colonies" (Knight, 1908b: 424). In migration, especially in fall, small numbers generally are seen with other field-inhabiting sparrows.

Remarks. The following county localities, where this species has occurred in spring and summer (including August), define the limits of known occurrence in the state: York, nine localities; Cumberland, at least a dozen towns, mostly in the western half; Oxford, six localities, the most northerly being Gilead, Bethel and Upton; Androscoggin, at Lewiston, Livermore, and Turner; Franklin, at Avon, New Vineyard, and Farmington; Kennebec, at Waterville, Readfield, Sidney, and Mt. Vernon; Sagadahoc, at Bowdoinham and Georgetown; Lincoln, one on June 5, 1908, on Monhegan (F. H. Allen, 1908: 97), and a male shot in August at Boothbay (Montgomery, 1890: 162); Knox, two seen at Camden (ibid.); Waldo, one seen in August, 1894, at Islesboro (R. Howe, 1900: 30); Somerset, seen once near Pittsfield at unstated

season (Knight, 1908b: 423), and May 1, 1904, at Skowhegan (Swain *in* Sweet, 1905c: 62); Piscataquis, possibly at Dover, but season not stated (Ritchie *in* Knight, op. cit.); Penobscot, "local summer resident, found in three places near Bangor" (Knight, ibid.); Hancock, has occurred one year each at Great Head, Bar Harbor, and Somesville, all on Mt. Desert Island (Tyson and Bond, 1941: 73), and May 21, 1904, at Castine (Ridley *in* Sweet, 1905c: 62); and Washington, has been seen at Cherryfield by Bond.

The breeding range certainly is not as large as this, probably extending only to the limits I have given in the first paragraph under this species.

In addition to the records for offshore Monhegan, cited above, this species was noted there in 1918 on October 12, 15, 17, and 19 (Wentworth *in* Jenney, 1919: 28).

The "little field Sparrow" of Williamson (1832: 148) may refer to this species. Audubon (1834: 230) stated that he saw few Field Sparrows in Maine. Beckett (*in* Norton, 1909g: 101) was very familiar with it in the Portland region before 1858. There probably has been a slight extension of summer range during the past hundred years, but this bird, which is known to have maintained small colonies in the same general vicinity for over fifty years, is not an aggressive pioneer in occupying more range.

Knight (1908b: 424) wrote: "However much it varies, the tones and general character of the song is very distinctive so that I had rather identify the bird by its notes than by seeing it." This is not to be recommended, however, for I have known of persons, thoroughly familiar with the species elsewhere, to 'identify' erroneously this species in spring on hearing the very similar 'Field Sparrow song' of some of our Song Sparrows.

A reported occurrence on April 7, 1905, at Biddeford, York County (*in* Brownson, 1906d: 68) was considered questionable by Norton. That one of these birds was seen several times in January, 1932, at Rockland, Knox County, as reported by May (1932a: 136), seems quite improbable.

Eastern White-crowned Sparrow

Zonotrichia leucophrys leucophrys (Forster)

Transient in spring and fall, varying in different years from uncommon to numerous (averaging rather common) west of the Penobscot River, and diminishing to occasional or rare in eastern Washington County; one *summer* record. One *winter* sight record for a bird of undetermined subspecies (see *Zonotrichia l. gambelii*, which follows the present bird).

Spring. This sparrow arrives in Cumberland County from May 5 to 10, rarely earlier, having been seen by Norton at Westbrook on April 26, 1908, and on April 30, 1893. An early occurrence for farther west is May 2, 1903, at Castine, Hancock County, as reported by Ridley (*in* Sweet, 1905a: 43). Arrival dates range from May 7 to 16 at Presque Isle (Chamberlain). The last stragglers leave Cumberland County as late as May 25 and 26, these also being the latest spring dates at hand for inland counties.

Fall. This species reappears in Cumberland County about October 1, and departs from the 20th to 26th. Dates earlier than September 28 are very unusual. A bird of the year was seen on September 14, 1941, at Cape Rosier, Hancock County (P. Allison), and occurrence was noted on September 22, 1904, at Avon, Franklin County (Sweet, 1905c: 62).

Summer. One was taken on July 27, 1880, near Bangor (Merrill *in* Smith, 1882–83: 484).

Ecology. This is a social and gregarious species, generally found in brushy thickets or edges of woodlands.

Remarks. Since Maine is on the eastern edge of the normal migration route of this species, it is rather natural that there should be great variations in the number of transients seen in the state in different seasons. As a general rule, more birds are seen in spring than fall in any given year. Of the several reports on such fluctuations, that of N. C. Brown (1876: 95) is a good example. He reported flocks at Portland in the spring of 1876, and only a single bird taken there in the preceding spring.

The following reports of summer occurrence are, perhaps, instances in which White-throated Sparrows were mistaken for White-crowned. The species was reported as having been seen during "nearly all" the summer months at Livermore, Androscoggin County, and a pair seen at nearby Androscoggin Lake in June, 1898, by Briggs (1901); to this report, Swain added an editorial note in which he stated that a pair remained until late June, 1887, at Farmington, Franklin County. Knight stated (1908b: 415) that, in Aroostook County, he had seen this bird in August in the Woolastook [=St. John] valley.

Gambel's White-crowned Sparrow

Zonotrichia leucophrys gambelii (Nuttall)

Hypothetical. In a letter to Norton, dated April 11, 1942, Gross wrote from Brunswick, Cumberland County: "This winter since December I have a bird visiting my feeding shelf which I took to be a White-crowned Sparrow. In fact, I never studied it and only gave it

a casual glance when it appeared. It did appear lighter or grayer in the facial region when I first saw it, but I paid no attention to the fact that it might be something else than the White-crowned. This week, however, it has been on the feeding shelf where I could observe it very closely and I have determined beyond any doubt that it is a Gambel's Sparrow. The space in front of the eyes is distinctly white without any black; the black line on the side of the head stops behind the eye. I have checked on all details so that I am now certain of the identification."

Remarks. Gross later wrote Norton that the bird was seen on April 14, 1942, and still later wrote me that he did not capture it.

A nearby extralimital record is for a specimen taken, October 5, 1911, on Grand Manan, that A. Brooks (1933: 72) considered to be of this race.

White-throated Sparrow

Zonotrichia albicollis (Gmelin)

Summer resident, numerous at higher elevations inland and common elsewhere, including islands, except, perhaps, absent from southern York and parts of western Cumberland County; *transient,* numerous throughout in spring and fall; *winter resident,* varying in different years from uncommon to nearly absent.

Spring. This sparrow generally arrives in southwestern Maine about April 24. Birds seen earlier than April 18 are likely to be winter residents. Migration reaches a peak about May 7 in the southwestern portion, and about May 12 to 14 from Bangor northward. Arrival dates range from April 19 to May 4 at Presque Isle (Chamberlain). Migration is completed by about May 23.

Fall. Although there is much local movement early in September, sizeable flights near the coast usually do not occur until about the 18th. By that date, practically all birds have departed from northern counties, and by the 25th from Cumberland County. Rather oddly, there are fewer records at hand for November than for any other month except March.

Breeding. Of this species, Knight (1908b: 418) wrote: "The nests are composed invariably of grass and mosses, lined with finer grasses and sedges and occasionally with a few feathers. They are placed on the ground, either at the foot of a small bush, on a hummock in a bushy pasture or in the open or dense woods, or under a brush pile in the woods or clearings. Nest building begins about May tenth and about a week is needed to complete a nest, the female only doing the work. An egg is laid each day until the set of four or five is completed.

Incubation requires twelve to fourteen days according to weather and other factors and the young leave the nest in fourteen days more. The eggs of the first brood hatch about June eighth and the young are ready to leave the nest by the twenty-second. A second brood is then reared in many instances. The male bird does not seem to either incubate or help to build but he does feed the young."

Little need be added to this account, except that nests often are found sunken quite deep in moss, and also that I found a bird incubating three, apparently fresh, eggs as late as August 4, 1941, in Township 7, Range 13, Piscataquis County.

Winter. Apparently these sparrows do not survive the winter very often except at feeding stations. They have been reported from localities in eight counties late in December, but later, as snows get deeper, the records are fewer and mostly for birds feeding about houses. There is reliable evidence that the species has wintered (or been collected in mid-winter) at: Hollis and Saco, York County; Lewiston, Androscoggin County; Portland, Falmouth, Freeport, and Brunswick, Cumberland County; Orono and Bangor, Penobscot County; Mt. Desert Island, Hancock County; and Lubec, Washington County. Not more than three birds have been seen through this season at any one place.

Ecology. On inshore and offshore islands, and inland, this is a characteristic bird of the edges of sheltered coniferous thickets, probably reaching its densest breeding population at elevations on the mountains where the thin soil supports only a stunted and openly-spaced growth of trees. It rarely is found in extensive unbroken stands of conifers, but wherever there are openings, or the trees have been cut or burned, and there is either slashing on the ground or mixed growth springing up, the White-throat is a common or even numerous species in summer. In Cumberland and York Counties, it breeds in greater numbers than the Junco. It also outnumbers the Junco elsewhere in much of southern Maine, according to Mendall. Migrants are found in weed fields, by roadsides, and near the edges of woodlands, the birds flying to brushy places if frightened in these open spots.

It is a social and gregarious species. Perhaps the most common associates are, in this order, the Junco, Song Sparrow, White-crowned Sparrow, and Hermit Thrush.

Eastern Fox Sparrow

Passerella iliaca iliaca (Merrem)

Transient, varying in numbers in different years, in spring generally numerous in western Maine, and common in the eastern portion, and

in fall sometimes numerous throughout, but often in lesser numbers at both seasons; rare in *winter*.

Spring. This sparrow generally arrives in Cumberland County about March 25, at Bangor about April 1, and at Presque Isle (where few are seen) about the 14th. There is, however, considerable variation in time of arrival. The peak population may be present within a very few days after the first birds are reported. In 1903, Brownson (1903: 42–43) saw flocks of 50 or more birds as early as March 14 at Cape Elizabeth. The earliest known occurrence is for birds seen on March 12, 1927, by F. Walker, at Scarborough, and the species has been seen as far north as Avon, Franklin County, and eastward to Mt. Desert Island by the 14th. At the latter locality, there were large numbers present on March 18, 1935 (Stupka). At any one place, numbers are generally present for only about two weeks. The latest dates for the Portland region are April 30, in 1875 (N. C. Brown, 1882f: 15), and in 1905 (Norton). The species has been seen at Hebron, Oxford County, as late as May 6, 1904, as reported by Johnson (*in* Brownson, 1906c: 64), and May 15, 1907 (Johnson *in* Brownson, 1908b: 49).

Fall. In northern counties, this bird reappears about October 15, and in Cumberland County about the 21st. There are dates for widely separated localities for as early as October 12, plus these earlier dates: October 3, 1910, at Ellsworth, Hancock County (Stanwood *in* Sweet, 1911a: 52); October 8, 1904, at Avon (Sweet, 1905c: 63); a large flight on October 9, 1908, at Damariscotta, Lincoln County (David, 1908: 119); and two seen on October 10, 1891, at Westbrook, Cumberland County (Norton). The fall of 1908 was unusual in that almost none was seen in the Portland region until November 1 (Brownson, 1908c: 120). The number of birds present generally dwindles after the second week in November, although Spinney (1898: 21) saw a large flight on the 16th in 1897, at Seguin, where the species seldom was seen in fall. The last birds generally depart by November 27, but single birds have been seen on at least seven different dates in the first 23 days of December. The latest of these are December 22, 1941, at Yarmouth, Cumberland County (Mrs. J. Corning), and the 23rd, in 1937 at Mt. Desert Island (Brower and others, 1938), and in 1939 on Monhegan (Mrs. J. A. Townsend).

Winter. Apparently these sparrows do not survive very often except at feeding stations, but even so, they are rare at this season. On January 24, 1909, one was seen near Portland (J. Fanning, 1909). That this bird is recorded as a "rare winter resident" on Mt. Desert Island (Tyson and Bond, 1941: 74) may be based on the December record for that locality, as given under Fall. Knight (1908b: 435) made a vague reference to the species' occurrence in February. In the winter of 1947–48, a few remained in York and in Cumberland County.

Ecology. In early spring, the flocks break up into little groups to hunt for food in thickets, open woodlands, and weedy places. Even if there is considerable snow on the ground, as is quite often the case after a late storm, the birds scratch holes, using both feet simultaneously, until they reach the leaves and other litter where their food is found. They are thus able to find food when many other transient birds are forced to go hungry. In fall scattered flocks often are seen in openings in conifers and mixed woodlands, on sunny slopes in hardwoods, and in brushy thickets. The species does not associate closely with other small birds as often as many other sparrows, but a large number of species that occasionally are seen with it could be listed.

Remarks. "Some years I have found this species to be exceedingly plentiful, other years rather scarce" (Mendall).

A few reports of September occurrence are considered questionable and so are not cited.

Northern Lincoln's Sparrow

Melospiza lincolnii lincolnii (Audubon)

Summer resident, uncommon but regular in parts of Oxford, Penobscot, Aroostook, Hancock, and Washington Counties (and probably elsewhere in bogs), and *visitant* in Lincoln and Knox; *transient* in spring and fall, uncommon to sometimes rather common in the southern third of the state and in Aroostook, Piscataquis, and Oxford Counties, and probably elsewhere.

Spring. This sparrow apparently arrives in southwestern counties by May 6 to 10, according to data at hand. A sight record for April 17, 1942, at Wells, York County, by G. Dunthorne, may be questionable, as this is very early even for southern New England. Two were seen on May 6, 1945, at Hampden, Penobscot County (C. Patterson). On May 12, 1900, a male was collected at Westbrook, Cumberland County (Norton, 1904d: 55), and on the same day, one was killed on the light at Seguin (Spinney). Chamberlain's first dates for Presque Isle range from May 13 to 25. The species has been seen on May 15, 1896, in the Umbagog region [? Me. or N. H. part] (Brewster *in* Griscom, 1938: 542); one was collected on May 18, 1882, near Bangor (Knight, 1898d); it has been seen May 16 to 21 on Mt. Desert Island (Tyson and Bond, 1941: 74); and seen on May 18, 1920, at Machias, Washington County (Kilburn, 1922a: 115). Birds have been seen migrating as late as May 28, 1900, at Seguin, according to Spinney (1903b: 58), and taken at Portland, on May 30, 1909 (H. M. Lewis,

1909), and June 1, 1907 (Norton, 1907c: 341), so migration probably extends into early June in northern and eastern counties.

Fall. As birds have been seen or collected in late August at places where they do not breed, there is some wandering or migration by then. A definite southward movement begins by the second week in September, with most birds seen from September 24 to October 13. On September 11, 1898, one was captured on Seguin (Spinney, 1900a); on September 19, 1908, one was found dead at Falmouth, Cumberland County, and on September 20, 1896, a female was shot at Westbrook (Norton *in* Knight, 1897d: 101). Late dates are: October 16, 1893, in the Umbagog region [? Me. or N. H. part] (Brewster *in* Griscom, 1938: 542); October 16 of unstated year on Mt. Desert Island (Mrs. E. A. Anthony *in* Tyson and Bond, 1941: 74); and October 17, 1918, on Monhegan (Wentworth *in* Jenney, 1919: 29).

Breeding and summer. The evidence points toward open, rather bushy, bogs as the preferred nesting habitat, but the species also has been seen in the breeding season in fairly extensive wet marshy places. "On June 14, 1936, Mr. Walter Clayton, of Lincoln, discovered a nest . . . in 'Keen's Bog' near Chester, Maine (Penobscot Co.). The nest, which Mr. Clayton kindly showed me, was imbedded in the sphagnum moss, near the middle and in an open part of the bog, and contained four eggs, apparently about to hatch. The female was very shy but the characteristic breast markings were noted, serving to identify her positively" (Bond, 1937a). The only other record is for four fresh eggs taken on July 15, 1941, at Upton, Oxford County, by Harris. R. F. Miller (1941: 135) reported seeing a "fledgling" on July 1, 1941, at Whitneyville, Washington County. The incubation and fledging periods apparently are not recorded, nor the number of broods per year.

In addition to the above mentioned localities, this species has been found in summer at the following places, under circumstances indicating breeding: about Fort Kent and along the St. John River in Aroostook County; on and near Mt. Katahdin; near Machias, between Cutler and Lubec, and near Harrington, Washington County; near Ship Harbor on Mt. Desert Island; and on several bogs in Penobscot County.

On July 15, 1934, Mendall saw one of these sparrows at South Thomaston, Knox County, and Cruickshank has one July and two August records for the Muscongus Bay region. The species probably does not breed at these places.

Ecology. Bogs are the best known summer habitat, although Kilburn (1922a) wrote that in the vicinity of Machias: "They frequented scrubby pastures and 'blueberry bogs.' One pair remained in such a

location near the Normal School during the spring and until August, when I left . . . I saw them repeatedly and heard the male sing on occasions, more rarely in summer up until the time I left. They haunted a boggy meadow, a partly cleared pasture and an alder swale. I was unable to locate a nest. On a trip fifteen miles north of Machias the last of June (June 29th) I noted as many as five Lincoln's Sparrows on or about a large bog through which ran a sluggish stream. These birds were all in full song."

"I have found this species in summer in grassy wasteland between Cutler and Lubec, in 'blueberry barrens' near Cherryfield and between Cutler and Lubec, and in Sphagnum bogs, such as the Bangor Bog and 'Big Heath' near Ship Harbor on Mt. Desert Island" (Bond).

The observations of Brewster (*in* Griscom, 1938: 542–544) show that fall migrants in Oxford County and vicinity generally were found in open grassy or weedy places, wet or dry, and usually near bushes. His fall observations, plus those for both spring and fall by others, indicate that migrating birds are almost always in company with other sparrows, the White-crowned, White-throated, Savannah, Swamp, and Song being noted most often.

Remarks. In 1928, Dr. Francis Harper and W. J. Hamilton, Jr. captured four Lincoln's Sparrows in mouse traps on and near Mt. Katahdin. Neither person saw a live bird of this species, however, during their stay of about four weeks in the region. The four specimens were immature birds, probably reared locally. Two were trapped on August 21 at Togue Ponds (elevation 600 ft.) along a stream. The third was taken on August 28, on the Tableland at Saddle Spring (elevation 4,280 ft.), beneath a boulder in the balsam scrub, and the fourth was taken on September 3 at Sandy Stream Pond, among sedges, spruce, *Ledum*, *Alnus*, *Kalmia angustifolia*, *Sarracenia*, and canoe birch.

This species was named by Audubon for his friend, Thomas Lincoln, of Dennysville, Washington County.

A report of one of these sparrows being seen for several days, beginning January 19, 1943, at a feeding station in Hallowell, Kennebec County, in the mimeographed *Bulletin of New England Bird Life*, would seem to me to be a case of wrong identification. The report of an April 5 occurrence at Farmington, Franklin County, by Swain (*in* Sweet, 1911a: 52), almost certainly is an error. Montgomery (1890: 162) reported collecting some of these sparrows; later, however, he corrected the identification to another species.

An early extralimital record is for a specimen taken on May 2, 1922, on Grand Manan Island, New Brunswick (Pettingill, 1939a: 371).

Eastern Swamp Sparrow

Melospiza georgiana georgiana (Latham)

Summer resident, very common in eastern Maine and fairly common elsewhere, including some islands; *transient,* very common in spring and rather numerous in fall throughout.

Spring. This sparrow generally arrives in southwestern Maine from April 12 to 20, but has been seen by Chamberlain at Presque Isle on the former date in 1945. Dates earlier than April 10 are: March 24, 1903, in Lincoln County (Swain, 1903: 19); March 30, 1907, at Farmington, Franklin County (Swain *in* Brownson, 1908b: 49); March 31, 1918, at Portland (Norton); April 7, 1907, at Portland (*in* Brownson, ibid.); and April 8, 1904, at Skowhegan, Somerset County (Swain *in* Sweet, 1905c: 63). On rare occasions, the species arrives very late, as in 1944 when Weston saw none at Brewer until May 5. Some birds usually are on breeding grounds and in full song by April 20, although others may be observed migrating as late as May 13.

Fall. Migration begins by the second week in September and continues throughout October, most birds being seen the first 24 days of the latter month. Late records are: two seen on November 5, 1939, at Brunswick, Cumberland County (Norton); two seen on November 9, 1941, at Cape Elizabeth (W. Taber); November 15, 1904, at Westbrook, Cumberland County (Norton *in* Brownson, 1906c: 64); and several seen from November 18 to 20, 1939, on Isle au Haut (Norton).

Breeding. "Though generally placed on the ground in a bunch of sedges or grasses in a meadow, the nests are also sometimes a few inches from the ground, even a foot up, in a low bush or shrub bordering a swale. Many nests have the dry grasses and sedges arched together over them while others are not arched. Practically all the nests I have seen were composed of dry grass blades and stems, sedge leaves and weed stems, lined with sedges and grasses" (Knight, 1908b: 433).

"Knight's statement that nests are 'generally placed on the ground' does not check with my observations. I have found over a score of nests, all of which were elevated from six inches to three feet above meadow or water. The majority actually were over water—Red-winged Blackbird fashion. Norton's remarks [under Ecology] are much more accurate as to breeding habitat in Maine" (Mendall).

"Nest building begins about May fifteenth, and in a week to ten days the female has finished her task, in which there is no evidence to show that the male aids her. An egg is laid each day until the set of four or five is completed, and incubation requires about thirteen days, varying from twelve to fifteen . . . In early July another brood is reared" (Knight, 1908b: 434).

The earliest specific date at hand for eggs is for four fresh ones on May 29, 1879, in Oxford County (Brewster *in* Griscom, 1938: 545), and the next is for four fresh on May 31, 1931, on Mt. Desert Island (Harris). Eckstorm collected four sets of four and one of five, ranging from fresh to half incubated, on dates from June 7 to 15, in Penobscot and Hancock Counties. The fledging period apparently is unrecorded.

Ecology. "A summer resident of general distribution, resorting to swamps and lagoons for the purpose of breeding, often in situations suitable to Red-winged Blackbirds, but occasionally it breeds in less boggy ground. Hence its distribution during the breeding season is necessarily localized. In autumn it swarms in rush-grown valleys, and wild weed patches near water, as well as the swamps, and even at this season strays to drier situations" (Norton, 1904d: 55–56).

This species, which is both gregarious and social, associates chiefly with other sparrow species.

Remarks. Boardman (1862: 127) stated that these sparrows arrived the last of March in eastern Washington County, and Smith (1882–83: 484) wrote: "Arrives in March and April" in Maine. No data are given to support these statements.

Peters and Burleigh (1945: 567) referred breeding birds from Newfoundland to the subspecies *ericypta*. Some transient Swamp Sparrows in Maine probably are of this subspecies.

Eastern Song Sparrow

Melospiza melodia melodia (Wilson)

Summer resident, common to rather numerous in settled areas and on grassy islands and in lesser numbers elsewhere; *transient,* numerous in spring and fall throughout; *winter resident,* uncommon but regular in coastal counties.

Spring. This sparrow generally arrives by March 20 in coastal counties east to Mt. Desert Island. Small flocks have been seen in this area as early as March 13, and it is not unusual for the species to be numerous there by the 25th. The first small flocks appear at Bangor and Orono from March 15 to 26, and at Presque Isle, according to Chamberlain, from March 17 to April 12. Migration continues into early May.

Fall. Migration apparently is in progress throughout September and most of October, and, chiefly along the coast, a few birds may be seen migrating from October 27 to November 13.

Breeding. Early nests usually are situated in dry spots in depressions in the ground where there is some vegetation early in the season, but

later ones are frequently off the ground in brush piles or tangles of vines. "Mr. Swain tells me he has found nests in natural cavities of old apple trees in orchards near Farmington [Franklin County]. June 7, 1895, I found a nest ten feet from the ground in the fork of a pine tree" (Knight, 1908b: 428). On May 27, 1931, I found a nest with five eggs in a vine-covered bird house on a stump at Brunswick, Cumberland County. There is better cover off the ground in the latter part of the nesting season, and the Song Sparrow takes advantage of it. The nest is built by the female, although Knight (ibid. 429) reported once seeing both birds "working" on one. It is composed of dry leaves, grasses, and strips of bark, and lined with fine grasses.

Three to five (usually four) eggs make a clutch, although Norton once found two partly incubated eggs, on July 30, 1887, at Westbrook, Cumberland County. As early as April 21, 1902, a bird was observed building a nest, by Norton, at Westbrook, and Knight (ibid.) stated that he had found young in the nest "rarely as early as May tenth." Brewster's earliest "complete set" of eggs for the Umbagog region [? Me. or N. H. part] was found on May 16, 1896 (*in* Griscom, 1938: 542). Most records for fresh or partly incubated sets are for May 23 to June 5. The latest date for eggs is for three fresh ones found by Norton on August 8, 1891, at Westbrook.

"The eggs hatch in ten to fourteen days according to circumstances, and the young leave in ten to fourteen days more. In the case of ground nests they run before able to fly . . . while in elevated nests they do not leave until later" (Knight, 1908b: 429). In her studies in Ohio, Mrs. Nice (1937: 133) found that the young were able to fly at 17 days, after having been out of the nest from several days to a week, and were independent of their parents at 28 to 30 days of age. Two, perhaps often three and rarely four, broods are raised in a season in Maine.

Winter. Single birds, or occasionally two or three, have been seen all winter in coastal counties east into Hancock. The species generally is reported as occurring throughout the season at several localities each winter. I find no certain evidence of winter survival at points well inland, although there are a number of December occurrences, the farthest inland of these being for a single bird seen by Chamberlain until late in the month at Fort Fairfield, Aroostook County.

Ecology. Knight (1908b: 428) wrote: "The species best loves the bushy river, brook and pond shores, meadows and marshes, but it is also common along the country roadsides in the bushes, and I have even found it nesting rarely in rocky woodland clearings in the uplands. It is however primarily a bird of the lower lands, preferring to live not far from water."

Although the Song Sparrow shows some preference for areas near water, it spends most of its time in drier situations than does the Savannah Sparrow. The former is more common on some inshore islands along the western coast, the latter in the rank grass on most other islands. In unsettled areas, the Song Sparrow is found in sizeable clearings and about the shores of lakes and ponds, but elsewhere generally is absent. The spring and fall flocks often associate with other sparrows and small birds that feed in open places.

Remarks. It is rather odd that the earliest specific mention of the occurrence in Maine of so common a species as the Song Sparrow should not have been until 1862, when both Hitchcock (1862: 69) and Boardman (1862: 127) included it in their lists.

The writer puts no faith in past attempts to divide this species into more than one subspecies in the northeast. There is evidently some slight ecological variation, but this appears not to have been investigated.

Common Lapland Longspur

Calcarius lapponicus lapponicus (Linnaeus)

Winter resident, regularly reported in small numbers at Scarborough and vicinity in Cumberland County, occasionally seen or captured in Oxford, York, Piscataquis, Hancock, and Washington Counties, and probably regularly uncommon elsewhere but generally overlooked; *transient* in unknown numbers (probably small).

Fall. This species generally arrives at the Scarborough beaches from October 2 to 30, five having been seen by G. Webb as early as September 23 in 1945. From two to 25 birds generally are seen when they first arrive, and a maximum of only about 30 has ever been seen there at any season, this number being noted by Norton on October 27, 1940.

Winter. Birds have been seen at Scarborough, Portland and Brunswick, in Cumberland County; Turner in Oxford; one at Orono in Penobscot; Mt. Desert Island in Hancock; about Calais and Lubec in Washington; and probably in other counties as well, but reports are too vague to include here.

Spring. Departure usually occurs from late February throughout March. Late dates for Cumberland County are: at Scarborough, 14 birds on February 22, 1926 (F. Walker), four on March 10, 1906, and a male shot on March 11, 1911 (Norton), and occurrence on March 14, 1927 (F. Walker); and at Brunswick, one was shot on March 27, 1916 (Walch, 1926: 60). Other late records include: an adult male shot on March 16, 1896, at St. George, Knox County (Norton, 1897c);

and one seen on April 9, 1922, at Fort Fairfield, Aroostook County (F. Kilburn).

Ecology. According to Norton's notes, the small flocks at Scarborough are found in sheltered places about the edges of grassy areas and out on the sand where vegetation is sparse. Here their food is mainly the seeds on the long spikes of marram grass (*Ammophila* sp.) and the seeds of orache (*Atriplex* sp.). Inland, they have been seen in fields where ragweed (*Ambrosia* sp.) and other weed stalks protrude above the snow. Associates, in decreasing order of frequency noted, are Horned Larks, Pipits, and Snow Buntings.

Remarks. Bonaparte (1828: 54) stated that a few birds appeared almost every year in the "higher, unsettled parts of Maine." The basis for this statement is unknown. Boardman (1862: 126) appears to have gotten the first specific data on occurrence, and it probably was through correspondence with him that Holmes (1861a: 117) included this bird in his Maine list.

Although N. C. Brown was very active in the field at Scarborough from 1870 to 1882, he did not find the species there during that period. Thereafter it occurred occasionally (N. C. Brown, 1923: 131), and Norton found it regularly from 1901 on.

Chestnut-collared Longspur

Calcarius ornatus (Townsend)

One specimen, apparently a young male, was collected on August 13, 1886, on the Little River Marshes at Scarborough, and its identity was checked by William Brewster (Goodale, 1887a).

Remarks. On February 12, 1904, the specimen was still in Dr. Goodale's collection (Norton, 1904b: 44).

A nearby extralimital record is for a male taken on Nantucket Island in the Grand Manan archipelago, on June 2, 1914 (Pettingill, 1939a: 372).

Eastern Snow Bunting

Plectrophenax nivalis nivalis (Linnaeus)

Winter resident, in most years common to numerous, especially coastwise, and in others, nearly absent; *transient,* when occurring in fall, generally numerous to abundant, especially coastwise, but in spring, apparently few, if any, pass through the state when the winter resident birds depart.

Fall. The species generally arrives from October 15 to November

12, being seen most often the last week in October at both inland and coastal points. Boardman (1862: 126) may have had good evidence for his statement that the species was seen "at times in September" in the Calais region, for two were collected near Brunswick, Cumberland County, as early as September 24, 1923, as reported by Walch (1926: 60). The next earliest specific date at hand is October 7, 1941, when a flock was seen by Eckstorm at New Sweden, Aroostook County. Knight (1908b: 395) stated that arrival by October 10 was very exceptional. A single bird was seen on October 11, 1882, at Lake Umbagog [? Me. or N. H. side] by Brewster (*in* Griscom, 1938: 536). In the fall there is a definite coastal migration, many birds generally passing through the state by this route, and others remaining for the winter.

Winter. When present, this species generally is numerous on the coast and islands, but in the interior it is wide-ranging and irregular, its movements there being caused by greater fluctuations in available food than apparently is the case on the coast.

Spring. The Snow Bunting usually departs in March, generally before the 23rd, but occasionally is seen until the end of the month. Later dates are: from March 31 to April 3, 1940, in the Katahdin region, by O. Scott (*in* Palmer and Taber, 1946: 312); April 3, 1890, at Westbrook, Cumberland County, and April 4, in 1888 and 1896, at Gorham, in the same county (Norton); April 5, 1896, at Seguin (Spinney); about 20 birds on April 10, 1874, at Cape Elizabeth (N. C. Brown); April 12, 1877, in the Portland region (N. C. Brown, 1882f: 13); several seen on April 14, 1888, at Westbrook (Norton); and several seen on April 29, 1947, at Big Lyford Pond, Township A, Range 12, Piscataquis County (Mrs. I. Sherman). There was considerable snow on the ground when the birds were seen in late April of 1947.

Ecology. On February 16, 1903, at Westbrook, "snow covered the ground to some depth, leaving only the tall weeds of the garden protruding above its surface. All at once the scene was enlivened by the appearance of about two hundred of these birds, which with an unrivalled vigor, dashed about, examining every weed, seizing upon all available seed. As those at one end of the flock had exhausted the supply at hand they rose and flew over their fellows to an ungleaned place; thus the scene was one of almost violent action as the flock seemed to roll over and over until the limit of the supply was reached when . . . all rose and sought another patch where the scene was repeated. . .

"Examination showed the weeds, so rapidly inspected, had been gleaned of their seed" (Norton, 1904b: 43).

On the coast and islands in fall, flocks often are seen on barren

rocky and sandy places where some remain all winter. When the snow comes and gives the weedy fields on higher ground the requisite bleak and barren aspect, they feed in this type of situation. The coastal flocks often are seen feeding near the water's edge and in the intertidal zone. Here they have been observed to eat the seeds of eelgrass (*Zostera*) (Norton, 1909f: 439), and, in the marshes of Cobscook Bay, in Washington County, those of glasswort (*Salicornia europaea*) (Mendall). "Along the coast they eat very small mollusks and crustaceans as well as grass and weed seeds of the characteristic coastal plants," according to Knight (1908b: 396), who also listed a number of plant seeds eaten on higher ground.

Most common associates seen in flocks of this species are Horned Larks and Lapland Longspurs. On March 23, 1929, at Brunswick, I saw a single Snow Bunting with a flock of Bronzed Grackles.

Remarks. For a discussion of alleged summer occurrence and supposed breeding, see Palmer and Taber (1946: 312).

As to numbers occurring in fall, Spinney (1898: 21) stated that at Seguin in 1897, "they commenced to make their appearance the 18th of October, and from that date until November 12th there was not a day favorable for flight that they did not pass over the islands by hundreds, in flocks of from six to fifty individuals." This was in decided contrast to the fall of 1905 when, Spinney (1906a: 49) reported, not over a hundred birds were seen the entire season.

In some winters, perhaps the fairly mild ones, apparently few birds enter the state. Data on such fluctuations are lacking, but in the winter of 1945–46 only two flocks were reported.

The first Maine record is that of Josselyn (1674; 1865b: 79), who wrote: "The *Snow*-Bird is like a *Chaf-Finch*, go in flocks and are good meat."

A recently reported summer occurrence, mentioned in 1938 in the mimeographed *Bulletin of New England Bird Life* (vol. 2, no. 8, p. 5), has been investigated and found to pertain to a bird which was not seen clearly enough to rule out the possibility of its having been a misidentified partial albino of some other species.

Lined Seed-eater

Sporophila lineola (Linnaeus)

An adult male of this South American species was collected by P. L. Wright on August 8, 1935, on Smuttynose Island in the Isles of Shoals (C. F. Jackson, 1936; P. L. Wright, 1937a: 44–45). This island is part of Kittery, York County. Birds of this species are kept as cage-birds, and the Maine specimen undoubtedly was an escaped captive.

RECAPITULATION*

Authentic birds of the state (includes those admitted on acceptable sight records)	
Species	339
Added subspecies	22
Introduced	
Established	3
Maintained by human aid	2
Not established	5
Hypothetical (13 species and 1 added subspecies)	14
Extirpated	4
Extinct	
Former occurrence known	3
No certain record, but undoubtedly occurred	1
Hypothetical	1
Fossil	1
Erroneously recorded	6
Noted under separate headings, but not enumerated above for various reasons	5
	406

* Some birds are placed rather arbitrarily in this tabulation. Examples are: The Northern Hairy Woodpecker, of which no typical specimen from Maine is known, is listed as a bird of the state; the Mute Swan, kept in captivity, is included in the bottom category above; the Eskimo Curlew is placed among the extinct birds; *Grus* spp. is counted as one species; and the introduced Pheasant is listed as maintained by human aid, although some persons believe it could survive without help.

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